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December 1986

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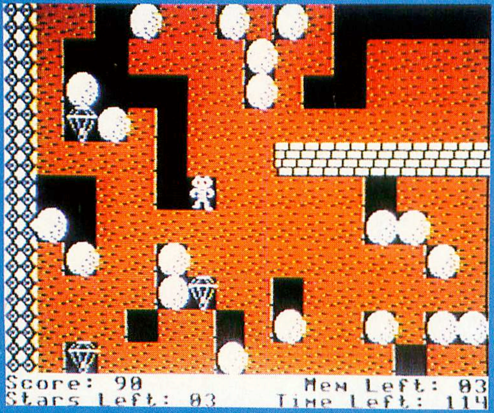

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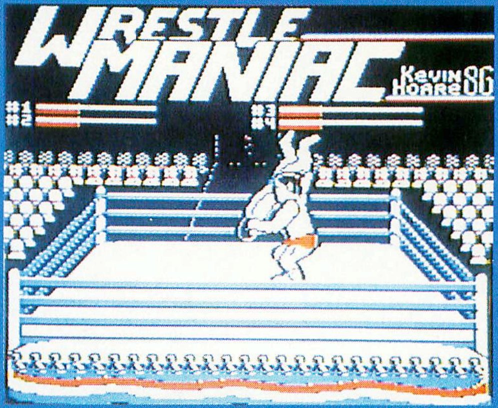

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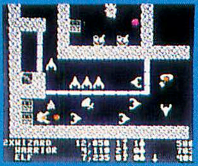

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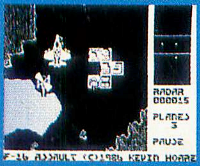
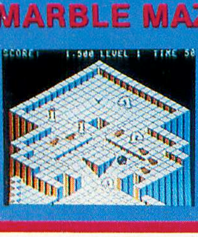
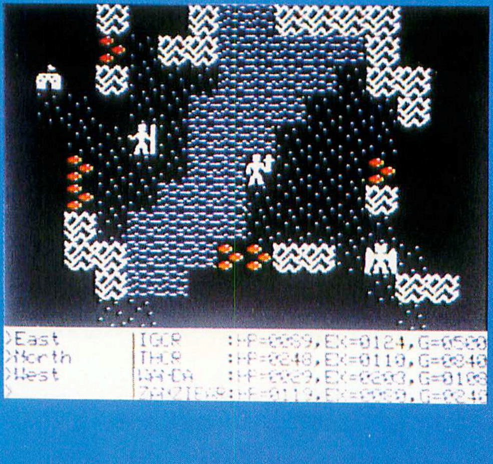


MARBLE MAZE



THE GATES OF DELIRIUM



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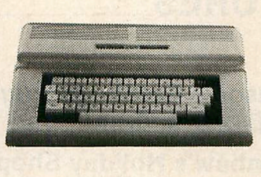

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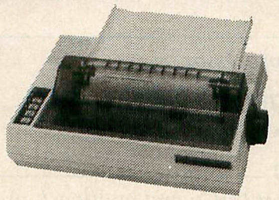

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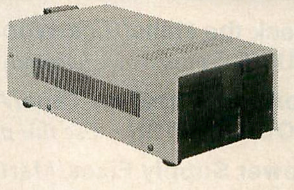

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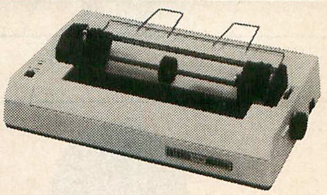

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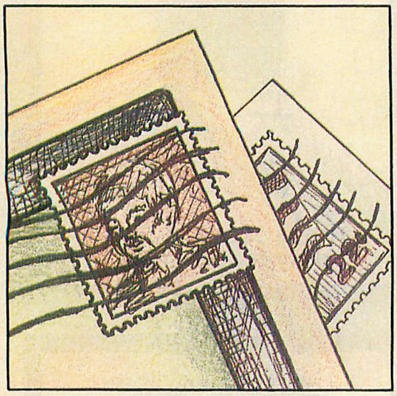
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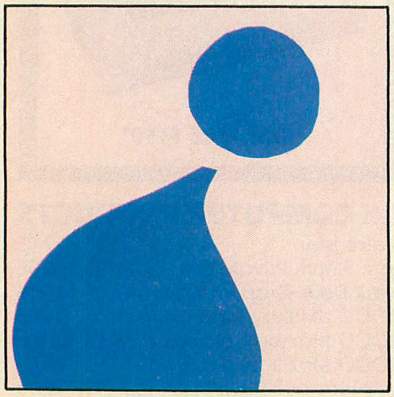
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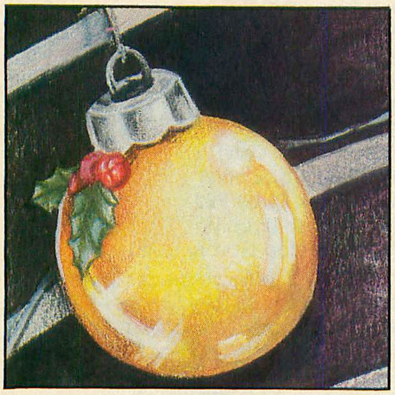
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by Fred Crawford

The cassette tape/disk symbols beside features and columns indicate that the program listings with those articles are on this month's RAINBOW ON TAPE and RAINBOW ON DISK. Those with only the disk symbol are not available on RAINBOW ON TAPE. For details, check the RAINBOW ON TAPE and RAINBOW ON DISK ads on pages 172 and 159.

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION
1A) Title of publication: The Rainbow, The Color Computer Monthly Magazine. B) Publication No.: 705050. 2) Date of filing: September 30, 1986. 3) Frequency of issue: Monthly. 3A) No. of issues published annually: 12. 3B) Annual subscription price: $31.00. 4) Complete Mailing Address of known office of publication: The Falsoft Building, 9509 U.S. Highway 42, Prospect, Jefferson County, Kentucky 40059. 5) Complete Mailing Address of headquarters of general business offices of the publisher: Same. 6) Names and complete addresses of publisher, editor, and managing editor: Publisher and Editor: Lawrence C. Falk, The Falsoft Building, 9509 U.S. Highway 42, Prospect, Kentucky 40059; Managing Editor: James E. Reed, The Falsoft Building, 9509 U.S. Highway 42, Prospect, Kentucky 40059. 7) Owner: Falsoft, Inc., The Falsoft Building, 9509 U.S. Highway 42, Prospect, Kentucky 40059. 8) Known bondholders, mortgagees and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages or other securities: None. 9) For completion by nonprofit organizations authorized to mail at special rates (Section 423.12 DMM). The purpose, function and nonprofit status of this organization and the exempt status for Federal Income tax purposes (Check one): Not applicable. 10) Extent and nature of circulation: (X)=Average No. copies each issue during preceding 12 months; (Y)=Actual No. copies of single issue published nearest to filing date. A) Total No. of copies printed: (X)71,554 (Y)69,200. B) Paid circulation: 1) Sales through dealers and carriers, street vendors and counter sales: (X)26,084 (Y)35,037. 2) Mail subscription: (X)35,487 (Y)31,789. C) Total paid circulation: (X)61,571 (Y)66,826. D) Free distribution by mail, carrier or other means, samples, complimentary and other free copies: (X)1,957 (Y)1,821. E) Total distribution: (X)63,528 (Y)68,647. F) Copies not distributed: 1) Office use, left over, unaccounted, spoiled after printing: (X)179 (Y)533. 2) Returns from news agents: (X)7,847 (Y)20. G) Total: (X)71,554 (Y)69,200.

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The RAINBOW

December 1986 Vol. VI No. 5

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THE RAINBOW is published every month of the year by FALSOFT, Inc., The Falsoft Building, 9509 U.S. Highway 42, P.O. Box 385, Prospect, KY 40059, phone (502) 228-4492. THE RAINBOW, RAINBOWfest and THE RAINBOW and RAINBOWfest logotypes are registered ® trademarks of FALSOFT, Inc. • Second class postage paid Prospect, KY and additional offices. USPS N. 705-050 (ISSN No. 0746-4797). POSTMASTER: Send address changes to THE RAINBOW, P.O. Box 385, Prospect, KY 40059. Forwarding Postage Guaranteed. Authorized as second class postage paid from Hamilton, Ontario by Canada Post, Ottawa, Ontario, Canada. • Entire contents copyright © by FALSOFT, Inc., 1986. THE RAINBOW is intended for the private use and pleasure of its subscribers and purchasers and reproduction by any means is prohibited. Use of information herein is for the single end use of purchasers and any other use is expressly prohibited. All programs herein are distributed in an "as is" basis, without warranty of any kind whatsoever. • Tandy, Color BASIC, Extended Color BASIC and Program Pak are registered ® trademarks of the Tandy Corp. • Subscriptions to THE RAINBOW are $31 per year in the United States. Canadian rates are U.S. $38. Surface mail to other countries is U.S. $68, air mail U.S. $103. All subscriptions begin with next available issue. • Limited back issues are available. Please see notice for issues that are in print and their costs. Payment accepted by VISA, MasterCard, American Express, cash, check or money order in U.S. currency only. Full refund after mailing of one issue. A refund of 10/12ths the subscription amount after two issues are mailed. No refund after mailing of three or more magazines.

LETTERS TO THE RAINBOW

But, What Does It Mean?

Editor:

Regarding the cover of the September 1986 RAINBOW, where the monitor is protruding through the cover, I recognize the wording as being from a Hard Drive Specialist advertisement. Why is this?

I want to thank you for publishing the letter from William Capich in the "Downloads" column [August 1986, Page 187]. I recently purchased a new 64K CoCo 2, with a 'B' after the model number. I knew that some newer CoCos had built-in lowercase and was hoping mine did as well.

The manual that came with the CoCo just said to type SHIFT-0 to get lowercase, it didn't mention the pokes Mr. Capich wrote about at all. It was disappointing to have the regular "checkerboard" characters.

Now I can have 16 different text screens! That orange lowercase is really easy on the eyes!

Lee Deuell
Shell Rock, IA

The screen shown on our September 1986 cover shows part of Tandy's demonstration program for the CoCo 3. The wording on the "backside" of the "torn" portion of the illustration is just something selected by our cover artist to represent the "insides" of a typical Rainbow. My, you are observant!

BACK TALK

Editor:

A letter in the August 1986 issue [Page 6] from Ronald Pettus discussed the lack of a carriage return at the end of each line when using *VIP Writer.*

To get around that problem, I use the programmable feature of *VIP Writer* to put a carriage return at the end of each line, after I have made the line width any value I desire (up to 240). However, it has one fault: It will not stop at the end of the document being altered, so you have to watch the monitor and press BREAK to make it stop. You can then save the result.

Press the following keys: BREAK, CLEAR, Z, E, UP ARROW, CLEAR, SHIFT-0, RIGHT ARROW, RIGHT ARROW, ENTER, DOWN ARROW, SHIFT-0 and DOWN ARROW. Type `100` and press ENTER.

To execute, go to top of document; having set the desired line width, press CLEAR and then E, and the process will start.

John Winchester Dana
Hamden, CT

HINTS AND TIPS

Editor:

Here's a change for anyone who wants to use the program *Picprt* [May 1986, Page 72] for a tape system.

Change all the `LOADM`s to `CLOADM`s in the BASIC program. After assembling the three machine language programs together type:

```
POKE&H797F,6:POKE&H7B0B,6:POKE&
H7B8F,29:POKE&H7B90,255:POKE7
D10,6:POKE&H7DBE,29:POKE7DBF,255
```

This changes the start and end addresses where the graphic picture is stored. You can now `CSAVEM` them as one program.

James R. Dean
Stirling, Ontario

Forget the Arrow Keys

Editor:

For those who would like to use a joystick instead of the arrow keys on Ira Goldwyn's *Scrambled Pix* [September 1986, Page 108], just replace lines 160 to 210 and 2010 with the following:

```
160 H=JOYSTK(0):V=JOYSTK(1)
170 P=PEEK(65280):IFP=1260RP=254
  THEN2000
180 IFH=0THENA=A+1:GOTO220
190 IFH=63THENA=A-1:GOTO220
200 IFV=0THENA=A+4:GOTO220
210 IFV=63THENA=A-4:GOTO220ELSE
  150
2010 P=PEEK(65280):IFP=126ORP=
  254THEN2000
```

This modification is for the right joystick. Press the firebutton to see what the picture is supposed to look like.

Donald S. Ricketts
Boring, OR

Don't Forget to Toggle

Editor:

I agree with Mike McPeek [October 1986, Page 9], when he said that without RAINBOW, his computer would just be an expensive paperweight on his desk.

I use *Telewriter 64* (disk version) for many tasks, both personal and business. One of the problems I often encountered was when I exited the editor to either load or save a file, I would forget to toggle to uppercase. This often resulted in saving a file with a lowercase filename or when attempting to load a file I would get the `File Not Found` message.

An easy solution to this was to add `POKE 282, 255` to the beginning of both the `S.XXX` and `S.ASC` filenames. By adding this poke, when you access the disk I/O programs, it toggles the computer to uppercase characters. This enhancement has saved me a lot of frustration.

Michael L. Dunn
Winton, CA

REQUEST HOTLINE

Editor:

I have a Radio Shack Color Computer 2. Where can I get a program that I can run through my Heathkit interface on a shortwave radio to bring the Morse code through my computer and onto my screen?

Robert G. Yerkes
1234 Putnam Howe Drive
Belpre, OH 45714

Barking up the Family Tree

Editor:

I have a 64K CoCo 2 with one disk drive and a CGP-220 (ink jet) printer. We own a kennel and I'm looking for a program that will keep dog show records, pedigrees, etc. Please send any information to me.

Stanley Hughes
VIP Kennel
Box 2630
Corinna, ME 04928

Gimme an Angle

Editor:

I am a tenth grader and would like to get information on where I could obtain a program on geometry.

Todd Kirchenberg
4004 S. 12 Place
Sheboygan, WI 53081

Paint the Fence; Wax the Car

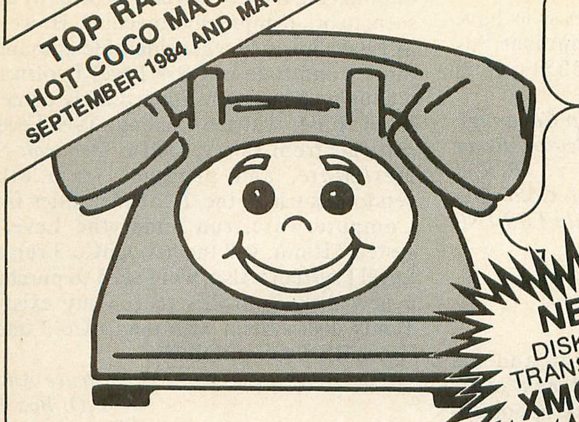
Editor:

I have a 64K CoCo and I am looking for a karate program. I would also like information on how to make a program run automatically after you load it from cassette.

Alan Asher
95 Korby Road
Esko, MN 55733

See Kung Fu Fighter *on Page 66 in the March 1986 issue. Also, Diecom Products has the game* Karate.

TOP RATINGS
HOT COCO MAGAZINE
SEPTEMBER 1984 AND MAY 1985



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Parker, *HOT CoCo*, 5/85

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INFORMATION PLEASE

Editor:

I am deaf and I recently tried to use my Tandy 64K CoCo 2 and modem to telephone other deaf people with a TTY (teleprinter). The modem on my computer did not work with the TTY. The TTY is only 50 baud and my computer modem is only 300/1200 baud. Can you make the modem program a true 50 baud? How much would it cost to make the programs sync?

John Metcalfe
5 Cooley Avenue
Macleod, Victoria 3085
Australia

Copy Cat

Editor:

I have a CoCo 2, J&M disk controller and a disk drive. How do you copy binary files from one disk to another with a single disk drive?

Thomas Crowe
Apartado aereo 2353
Villavicencio, Colombia
South America

> *To copy any file from one disk to another on a one-drive system, insert the disk with the file to be copied and type* `COPY` filename.ext *ENTER. The computer will prompt you to insert the original and, then, the destination disk. The file will be copied with the same name, so if there is already a file with that name on the new disk you should rename or kill it first.*

The Force was with Him

Editor:

I have a copy of *Colorkit* from Arizin, Inc. in Scottsdale, Ariz., and have used it a lot. Last week I was unable to load it because it gave me an error. Like a good disk system user, I tried to load my backup copy. No go, my backup copy was *under a bag of magnets* my wife had purchased for next Christmas.

Bruce Butterfield
3318 Pepperwood Lane
Fort Collins, CO 80525

Expanding Horizons

Editor:

I have a DMP-105 printer which I use with my CoCo 2. I often print out graphics displays. I use the *Hi-Res Screen Print Utilities*. My printer will only print half-width pictures. The manual that came with the print utility said to check the printer manual on how to set the printer to the expanded print mode. When I looked in the manual for my printer I found no such information. I tried the elongated font (`CHR$(14)`) but that did not work. Is there any way to set my printer to the expanded print mode?

Tom Cook
229 N. Second Avenue
Villa Park, IL 60181

Bonkers Over BBSs

Editor:

I am in search of CoCo users who have any BBS numbers, telecommunications software or public domain BBS system software they can send me.

Philip Cavanagh
6840 Beaton Road
R.R. 3
Sooke, British Columbia
Canada V0S 1N0

Radio Rodeo

Editor:

I am a Ham radio operator and am looking for CW, RTTY, and any other programs for my Tandy Color Computer. . . .

Silvio Araujo
950 N.E. 100th Street
Miami Shores, FL 33138

Editor:

. . . I have been looking for a program that would translate CW (continuous wave Morse code transmission) and RTTY from a shortwave radio. Have you ever printed anything on this order in RAINBOW. . . ?

Charles Dockham
36 Davey Street
Buffalo, NY 14206

Editor:

. . . I would like to know if the February 1985 issue of your magazine dealing with weather fax printouts using the 64K Color Computer is still available, and also, whether subsequent issues are available dealing with this subject and RTTY reception in general?

Leigh Wright
3020 Bridgeway #452
Sausalito, CA 94965

> *In addition to the* WEFAX *program on Page 42 in our February 1985 issue, see Page 36 in the November 1986 issue for coverage of RTTY.*

THE NEW ADDITION

Editor:

In the September 1986 issue of RAINBOW I was thrilled to read that Tandy had introduced the CoCo 3. In Steve Bjork's commentary [Page 26], he stated that a graphics resolution of 640 by 225 could be achieved using the analog RGB monitor. However, in both the 1987 Tandy catalog and in the brochure I picked up in the Radio Shack Computer Center it stated that the highest resolution possible for the CoCo 3 with a CM-8 was 640 by 192. Please explain this conflict in specs.

Jay Puckhaber
1057 Echo Woods Court
Clarkston, GA 30021

> *The highest resolution requires OS-9 and certain programming techniques as well as an analog RGB monitor.*

Editor:

I just received your September 1986 issue announcing the CoCo 3 and it certainly does seem to be an impressive machine. However, as I have invested a considerable amount of money and time in OS-9 Level I software, a couple of questions immediately come to mind. First, will the existing OS-9 Level I software from Tandy, such as *Dynacalc* and *DeskMate*, and products from other vendors, such as the *Textool* utilities from Computerware, run under the Level II system? If not, will the new CoCo 3 run the Level I system? Also, will I need to purchase a new disk controller to run my existing Tandy disk system with the CoCo 3 under either RS-DOS or OS-9?

Bruce Albert
P.O. Box 174
Cedar Glen, CA 92321

> *The CoCo 3 will operate under the OS-9 Level I system.*
>
> *We expect these programs to work, but we, too, are waiting to receive Level II OS-9.*
>
> *As long as you have Disk Extended* BASIC *1.0 or 1.1, you'll have no trouble with the CoCo 3.*

Editor:

I am very excited about the new CoCo 3. I have a couple of questions concerning this new computer. In Steve Bjork's article he said that artifact colors were not available with the new CM-8 RGB monitor. Are artifact colors available at all on the CoCo 3 and, if so, would you be able to get them if the computer was set at composite instead of RGB with the CM-8 monitor? Also, I would like to know if windows can be used without OS-9. The CoCo 3 looks great and I plan on buying it as soon as all my questions are cleared up about the CoCo 3.

George J. Hoffman
161 Youngblood Avenue
Shavertown, PA 18708

> *Artifact colors* are *supported on the CoCo 3 but only when using a composite color monitor or TV. The CM-8 is strictly an RGB analog monitor* and does not *support artifacting.*

Editor:

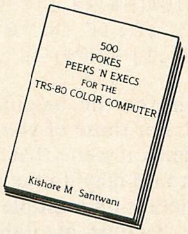
To start off, the introduction of the CoCo 3 is not a great thing. I am sure some of the owners of the CoCo 1 and 2 are not happy about this news.

The CoCo 3 is better than the old ones so what are we, the proud owners of the older models to do — get the new CoCo 3? What if the CoCo 3 has its own software, what are we supposed to do, sit around and let the CoCo 3 take over and leave the older models to rust?

I propose that the CoCo makers develop an extension for the old CoCos to make it like the CoCo 3. Like adding extra chips to the computer to make it like new so we don't have to be left out in the cold. If this can be

500 POKEs, PEEKs, 'N EXECs

FOR THE TRS-80 COCO



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TRS-80 COLOR COMPUTER

Kishore M Santwani

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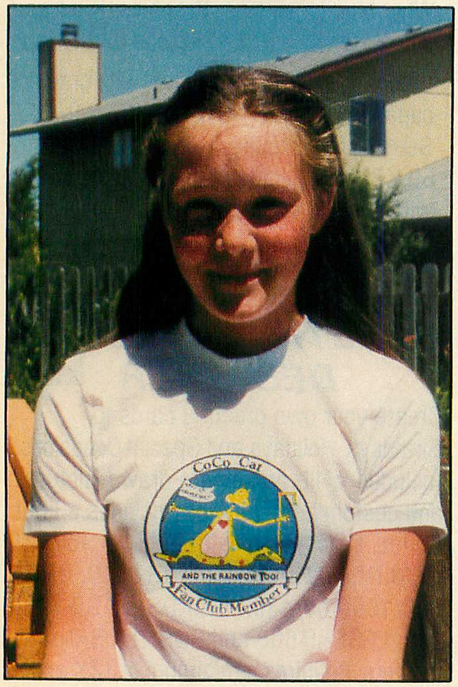
done, a lot of people would save a lot of money instead of getting the new CoCo 3.

Anthony Achong
265 Cherry Street
New York, NY 10002

> *We consider the CoCo 3 to be progress in a fast-changing computer world. It would not be feasible to offer an upgrade from the CoCo 2 to the CoCo 3. Due to the advanced technology and design used in the CoCo 3, such an upgrade would require replacing the CoCo 2 circuit board with a new one. This would not be cost effective.*

CoCo Cat Art



Gladys Chappell
Kennewick, WA

Patchin' Up *Writer-Zap*

Editor:

For those readers who eagerly typed in *Writer-Zap* [September 1986, Page 116] only to see their screen display `INCOMPATIBLE VERSION`, I have a patch to Ian Millard's outstanding program that may solve the problem. I have been waiting a long time for a program like this and was determined to make it work. After some searching around my *VIP Writer* disk, I was successful.

To see if this patch will work, change the `57` in Line 140 to `48`. Run the program. If it makes it to `PART I - TABS`, break out of the program and type in the following changes:

Line 150: change `95` to `61`, `104` to `70`, `94` to `60`
Line 220: change `5344` to `65344`
Line 230: change `126` to `92`
Delete lines 240 and 250
Add lines 262 and 264:

```
262 C=97:D$="3":GOSUB 340
264 C=99:D$="4":GOSUB 340
```

Note: When entering codes for `CLEAR 3` and `CLEAR 4` only a one-digit printer code is possible, so do not enter an escape code at the first prompt. Just press the ENTER key to skip to the next prompt and enter a single printer code.

Line 260: delete `C$=A$`: change `1` to `95`
Line 270: change `8` to `102`
Line 280: change `11` to `105`
Line 290: change `14` to `108`
Line 300: change `17` to `111`
Line 310: change `20` to `114`
Line 320: change `23` to `117`
Line 330: change `C$` to `A$` change `B$` to `C$`
Line 430: add `B=B-1:` to the beginning of the line
Line 440: change `37` to `21`, `64` to `48`, `59` to `43`
Line 470: add `:PRINT@155,E$` to the end of the line.

Now if someone can just figure out how to modify the fire-up screen parameters (`I`, `C`, `24`, `64n` and `width64`) *Writer-Zap* will be complete.

Doug Thorsvik
Biloxi, MS

Editor:

We have received dozens of requests for further information on *Writer-Zap* [September 1986, Page 116] and we want to clear up any misconceptions caused by the `INCOMPATIBLE VERSION` statement. That test was added as an afterthought, just in case someone tried to use *Writer-Zap* on a version of *VIP Writer* that had been modified, thereby destroying their word processor. We were unaware that there was an older version of *VIP Writer* on the market, and did not intend leaving large numbers of users out in the cold.

For those people running 1.0, *Writer-Zap* may not have worked. These folks should replace these two lines as shown:

```
30 FOR A=3584 TO 3659:READ B:POKE
  A,B:NEXT A:EXEC&HE00

570 DATA 134,32,142,4,0,167,128,
  140,6,0,38,249,142,4,42,49,141,
  0,23,141,2,32,13,166,160,129,
  64,38,1,57,128
```

I want to thank Doug Thorsvik for his research to produce the patch he has sent to THE RAINBOW. As we have been unable to get a copy of the old *VIP Writer*, we could not confirm the value changes that Doug has provided.

However, we have an addition that allows the user to change his line width default by adding the following line.

```
195 PRINT"LINE WIDTH DEFAULT IS"
  ASC(MID$(A$,72,1)):INPUT"CHANGE
  IT TO";C:IF C<>0 THEN MID$
  (A$,72,1)=CHR$(C)
```

The `72` is for the original version of *Writer-Zap*. For those of you with compatibility problems, it seems that changing these two values to `63` may do the trick.

Further details on multiple printer driver codes have become available. For more information, call (416) 456-0032 or write me.

Ian Millard
18 Rowe Court
Brampton, Ontario
Canada L6X 2S2

BOUQUETS AND BRICKBATS

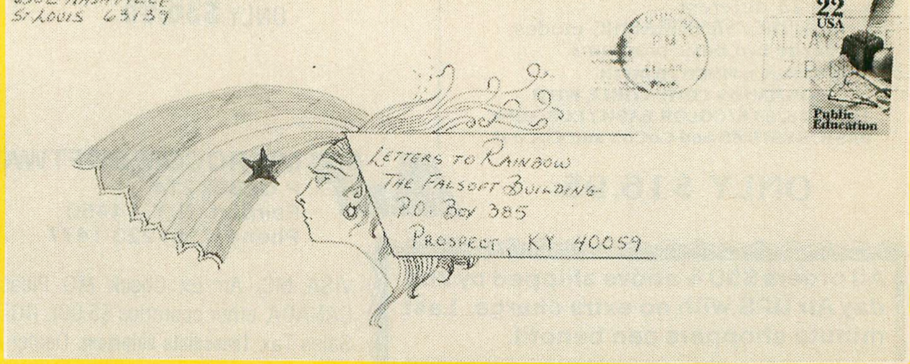
Editor:

I would like to say thanks to Dayton Associates for the technical support I received from them on my newly purchased Gemini NX-10. Thanks, Dayton, for the fast and professional response.

Tracy Walker
Donaldsonville, LA

Continued on Page 176

ARTS AND LETTERS



Envelope of the Month

M. Redelsheimer
St. Louis, MO

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New CoCo 3 Brings Back Memories of the Early Excitement

Kim Vincent had some interesting news for me today and I thought I might share it with you because it is some truly exciting information for all of us.

Kim, who we sometimes call "KJK" because about half the letters she gets here are addressed to the wrong first name and the most frequent mistakes are "Kit" and "Jim" (thus *K*it, *J*im, *K*im), said that last week she got a number of calls from people in South Carolina interested in advertising new CoCo 3 products in THE RAINBOW.

"How come all from the same place?" asked Kim, who — along with Jack Garland in the eastern part of the country and Cindy Shackleford in the West — sells advertising space in this magazine.

Kim likes to ask questions and I am not always certain of the answers. This time, though, I was. "Simple," I said, "There is a Tandy warehouse in South Carolina and it is obvious that some of the first CoCo 3s to be released got into the hands of people who placed orders at stores close to the warehouse."

Now, despite the fact that we would like to see more advertising in THE RAINBOW for a wide variety of reasons, this news is heartening for other reasons as well. I have been part of this whole market long enough to remember the earlier days of the CoCo when just about everyone (or so it seemed) had some idea for a program for this fantastic computer.

The most interesting thing about all of that is that many of those people — the Paul Searbys, Tom Mixes, Bob Rosens, Howard Cohens and Ron Krebses — have established some fine businesses for themselves. They came out early, developed more sophisticated programs as time went on, and became some of the leaders of the CoCo Community. They also — as I did— had a lot of fun doing it, and made some money as well.

I am reminded, too, of people whose names you might not know. People like Wayne Diercks, Mel Heftner and Arnold Pouch. They each developed good programs for CoCo in the early days. Wayne's business got to be too big for him and he sold out to another company who still markets his programs; Mel was the world's leading expert in screen dump programs, but with the advent of super-graphics programs the need for screen dumps pretty much went away, at least as a commercial product; Arnold was one of the most innovative minds I have known in any computer market. Sadly, he has passed away.

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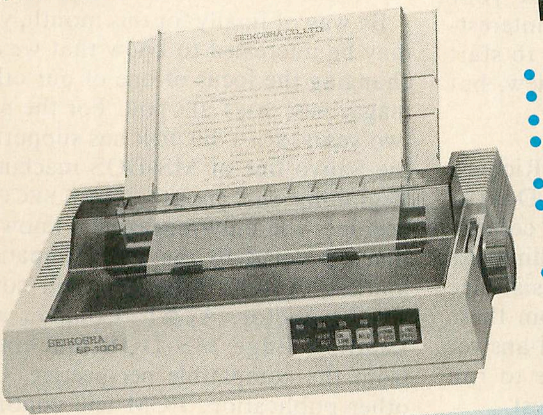

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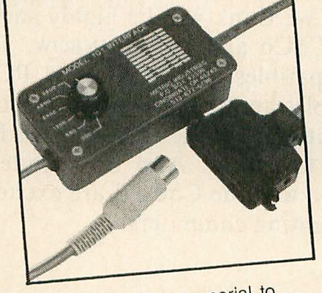
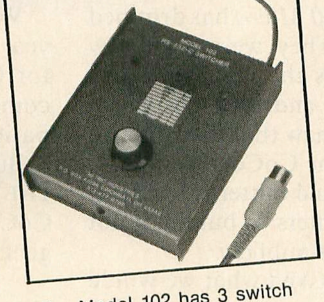
Printer is covered with a two-year warranty.

Model 101 Interface $39.95



The Model 101 is a serial to parallel interface intended for use with a COCO and any Centronics compatible parallel input printer. The 101 has 6 switch selectable baud rates (300-9600). The 101 is only 4″ × 2″ × 1″ and comes with all cables and connectors for your computer and printer.

Model 102 Switcher $35.95

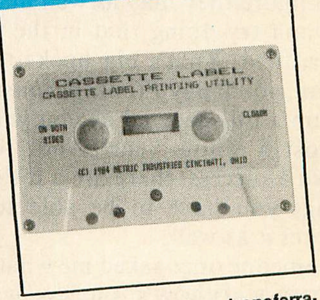


The Model 102 has 3 switch positions that allow you to switch your computer's serial output between 3 different devices (modem, printers or another computer). The 102 has color coded lights that indicate the switch position. These lights also act as power indicators to let you know your computer is on. Supplied with the 102 are color coded labels that can be applied to your accessories. The 102 has a heavy guage anodized aluminum cabinet with non-slip rubber feet.

The Model 104 Deluxe Interface $51.95

The Model 104 is a serial to parallel interface like the Model 101 but it has the added feature of a serial port (sometimes referred to as a modem switch). This feature allows the connection of a parallel printer and any serial device (modem, serial printer etc.) to your computer. You may then select either output, serial or parallel, with the flip of a switch. The 104 is only 4.5″ × 2.5″ × 1.25″ and comes with all cables and connectors for your computer. You supply the serial cable for your modem or other serial device.

Cassette Label Program $6.95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The Model 101, 102, and 104 work with any COCO including COCO3, any level basic and any memory size. These products are covered by a **1 year warranty.**

The 101 and 104 require power in order to operate. Most printers can supply power to your interface. Star, Radio Shack, and Okidata are just a few that do. Epson and Seikosha do not. The interfaces can also be powered by an AC adapter (Radio Shack Model 273-1431 plugs into all models). If you require a power supply, add a "P" to the Model number and $5.00 to the price (Model 101P $44.95, MODEL 104P $56.95).

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But Wayne, Mel and Arnold all had a lot of fun in the computer business, got to know a lot of people, and put a not inconsiderable amount of money in their own pockets. It was his success, after all, which led Wayne to sell out.

All of these people, and lots of others, were early entrants into the CoCo market — in something like the first 18 months. It was a new market, thriving with enthusiasm and energy. There were new ideas almost every day.

Most of those early programs and ideas came from something someone wanted to do with their computer. When they did it well enough to satisfy themselves, they brushed it up and started selling it. I did, too. I wrote a program, an Adventure called *Vampire*, which enjoyed limited success. Of course, THE RAINBOW enjoyed a lot more, but that's another story.

That's why I'm encouraged by the news Kim brings. The story is a familiar one. Tandy puts a really neat computer in the hands of some creative people, they see something they want to do, and they figure they may as well market it.

Don't try doing that in the IBM or Atari field. That's big bucks territory. Shoot, you'll pay *PC Magazine* as much to run a full-page ad as you will us for almost a whole year! And, to really make a success, there are a lot of other things you have to be able to do to market it as well.

Someone once asked me what the key to THE RAINBOW's success was. The answer was a very simple one: We have always made it possible for people to be successful. Our business is your success — whether it is learning how to get the most out of your CoCo, or whether it is selling CoCo software or hardware. If you succeed, we succeed. It's as simple as that.

Perhaps that is why I am most excited about KJK's news. I sense a stirring of new ideas, new products, new uses — innovations in general. It bodes well for CoCo.

If you have an idea, call Kim or Jack or Cindy. They'll be happy to help. I look forward to hearing about your ideas, and I am sure they'll be interesting. After all, here is a chance to start off on the ground floor of a new, but well-established, marketplace.

We are very glad to welcome Richard Esposito to these pages as Doctor ASCII. I've admired Richard's column for quite some time and his willingness to share information and assistance with others. As is obvious from these pages, we think question-and-answer columns are good and we like to run them. Richard's is one of the best.

It is really appropriate to thank Eric Maloney, editor-in-chief of *80 Micro* for allowing us to use the Doctor ASCII name for the column.

I am sorry that *80 Micro* has dropped CoCo coverage. They were a worthy competitor, as was the magazine they first gave birth to and then absorbed, *HOT CoCo*. We knew that they did not plan to continue the CoCo coverage — *80 Micro*'s bread and butter is Model I, II, III and 4 computers — but felt it not politic to comment publicly.

Someone once asked what we would do if there were no competition. The answer is that we will keep on keeping on. And, by the way, there are no plans for an increase in subscription rates this coming year — just as there was no increase last year.

We're sorry to see the CoCo coverage end in *80 Micro*, but understand why it must. Its main base of readers have Z-80-based computers and surely don't want the space devoted to CoCo (or MS-DOS, for that matter) when it could be used for their own machines.

By way of finally for this month, you may be interested to know that we are changing the focus of one of our other magazines, SOFT SECTOR. For the past two years, SOFT SECTOR has supported the Sanyo line of MS-DOS machines. Beginning this month, SOFT SECTOR becomes the only magazine I know of that's devoted to the PC Compatible market. Among others, it will cover Tandy, Victor, AT&T, Compaq and Leading Edge MS-DOS machines, from the compatible perspective. Our other publication, PCM will continue to cover the Tandy MS-DOS and portable computers exclusively. But SOFT SECTOR will be something different and we look forward to its debut.

We also look forward to 1987 — a year we think will be highly successful for CoCo and THE RAINBOW, Tandy's compatibles and PCM, and PC compatibles and the new SOFT SECTOR.

But most of the excitement is here at THE RAINBOW. And no wonder; the CoCo and the CoCo 3 are excitement-generating computers!

— Lonnie Falk

ASSEMBLY LANGUAGE PROGRAMMING for the TRS-80 COLOR COMPUTER

At last - The book exclusively for you and your CoCo !! You've learned BASIC and are now ready to learn assembly language programming. This hands-on guide begins with the basics and progresses to the expert level; revealing programming conventions and techniques and all the internal capabilities of the TDP-100, CoCo 1 and 2. At every step of the way are illustrations, sample programs, and plain English explanations. All sample programs are shown as assembled with Radio Shack's EDTASM+ cartridge. Plus, a complete chapter explains how to use all EDTASM+ capabilities. This book describes how to write subroutines, interrupt handlers, programs that control the graphics display modes, cassette, disk, keyboard, sound, joysticks, serial I/O, interrupts, and use of ROM resident subroutines. Also covered are the MC6809E microprocessor, the video display generator (VDG), peripheral interface adapters (PIA), SAM, memory, and how they all work together. Suitable as a high school or college textbook.

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289 pages
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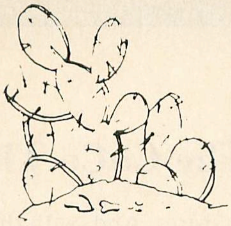

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This program combines all the things you look for in a great two disk graphics adventure program. The Hi-Res graphics are superbly done. The text portion of the screen and the graphics change quickly as you move through the **HALL OF THE KING.** You can move freely from one portion of the adventure to another. Call up your inventory at any time. You can even save or load a game at ANY time. **HALL OF THE KING** will challenge even the most seasoned adventurer.

HALL OF THE KING requires 64K EB and one disk drive. This exciting two disk adventure comes packaged in a vinyl case. **$39.95.**

HALL OF THE KING II (Rainbow Review 9/86)

Continue your quest for the Earthstone in The Inner Chambers of the **HALL OF THE KING.** Outstanding graphics help show the way to success in your search to help restore the legendary power of the Earthstone to the dwarven race. The deeper you travel into the inner chambers, the more difficult your progress becomes. **HALL OF THE KING II** has all the fine features of the first adventure. It is designed to follow the original **HALL OF THE KING** but may be played as a stand-alone adventure. The adventure fills two disks and comes packaged in a handsome vinyl folder. It requires one disk drive and 64K. **$39.95**

WARP FACTOR X (Rainbow Review 2/86)

If you have been waiting for a game for your color computer that has everything, your wait is over. **WARP FACTOR X** is here. This all graphics simulation game requires strategy, fast thinking, an eye for detail, and above all experience in knowing the capabilities of your starship and its computer. (See review in Feb. 85 issue of Rainbow.) It requires 32K one disk drive and comes packaged in a vinyl library case. **$34.95**

DARKMOOR HOLD (Rainbow Review 8/86)

You and your comrades will explore the levels of Darkmoor Hold in an effort to gain great riches and defeat the dark wizard. The Wizard will soon realize the threat you pose and the many monsters you meet and battle will become stonger and more powerful as you move through the 10 levels of Darkmoor. A keen eye will help you find weapons and armor to aid your battle along with treasures for you to keep. Your party consists of a Dwarf, an Elf, and you, the Human, each with their own special attributes. The weapons, armor and treasure are placed randomly in each level to provide a new challenge each time you play. You may also save the game you are playing since defeating the evil Wizard is not an easy task. It has great graphics and an impressive text screen to give you more fun than a barrel of elves. Requires 64KEB and 1 disk drive. **$29.95**

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DRAGON BLADE (Rainbow Review 11/86)

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The Color Computer 3 . . .
. . . and The CoCo Three

At long last, the Color Computer 3 is in the stores. And, with the holiday season upon us, it's being offered at a sale price of $199.95. Then, too, the 64K Color Computer 2 is also on sale and it is just $99.95. With that kind of "byte for the buck," the favorite add-on to many CoCo systems this Christmas will be a new CoCo itself!

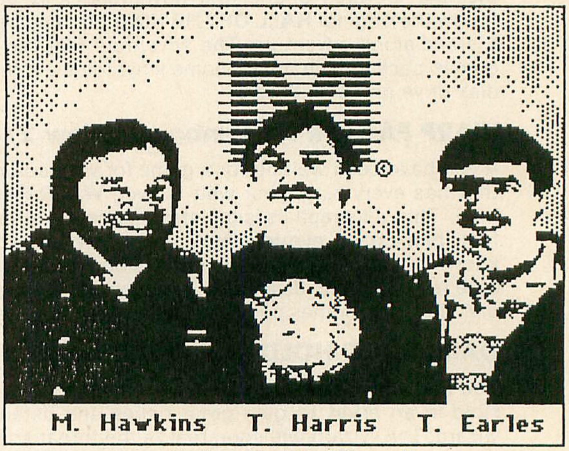
Historically, the CoCo is Tandy's strongest seller during the holiday season. Tandy's Ed Juge says, "Each year, Christmas sales of the Color Computer break the previous year's record. So, we are very optimistic about the continued success of this machine."

To help you drop a few not-so-subtle hints for those preparing Christmas lists, we've included a Holiday Shopping Guide in this Holiday issue. For maximum effect, we suggest you use a grease pencil to circle a few items on pages 25-28 and then sort of prop the magazine open on the coffee table for a few days. It never hurts to give Santa a helping hand now and then.

Speaking of the CoCo 3, if you'd like to surprise your favorite Radio Shack salespersons, tell them to hold the `CTRL` and `ALT` keys down while powering up the new machine. Yep! In addition to the Chicago Seven, Dirty Dozen and Jackson Five, we now have "The CoCo Three," Mark Hawkins, Tim Harris and T. Earles. These intrepid programmers, also known as the Good, the Bad and the Ugly — though not necessarily in that order — have their picture embedded in the ROM of our CoCo 3.

More in a future issue on these "Three Mugateers," immortalized in the screen dump at right. In the meantime, let's have an informal "Free the CoCo Three" contest. Without getting bogged down in rules, we'll send a free tape of CoCo programs to the first person from each state who writes in with an alternate way (other than the method above) to make The CoCo Three appear on the screen.

Saving the digitized picture to disk is easy enough; it's a standard `PMODE 4` graphics screen. Simply press the reset button after viewing the picture and type `SAVEM "PICTURE",&H0E00, &H25FF, &HA027`. To view the picture on a CoCo 1 or 2, load the file and type `10 PMODE4,1:SCREEN1,1: GOTO 10` and run it. You may notice an extraneous black line to the left of the picture when you reload the file, due to a glitch caused by the reset process. This can be removed with any graphics editor. To make a printout, you'll need a screen dump program.



"The CoCo Three"

As I write this column, we are packing our suitcases for the Princeton RAINBOWfest. One of the highlights we expect will be a round-table on "The Design, Development and Marketing of the CoCo 3." Scheduled speakers include Tandy's Barry Thompson and Mark Siegel, as well as independent CoCo 3 programmers Steve Bjork and Greg Zumwalt. Our plans are to tape record this panel discussion for the benefit of those who could not attend the show, so check Page 174 for details on ordering a copy.

Lastly, in the spirit of CoCo Community, that special feeling that has made us all friends over the past few years, from our house to yours, best wishes for a happy holiday season and a prosperous new year!

— Jim Reed

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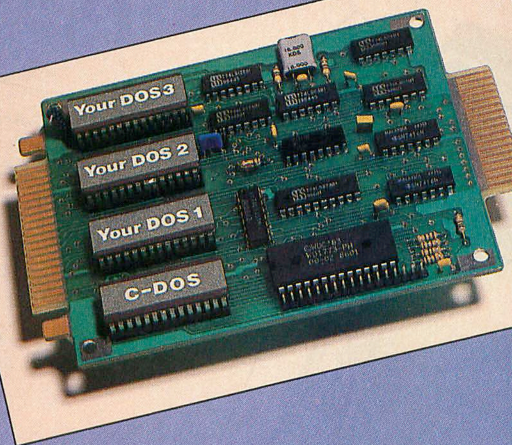

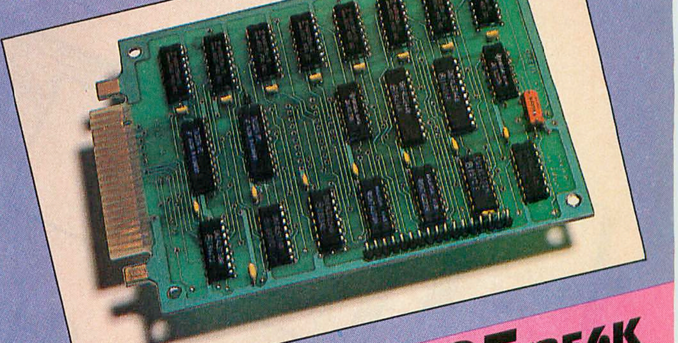

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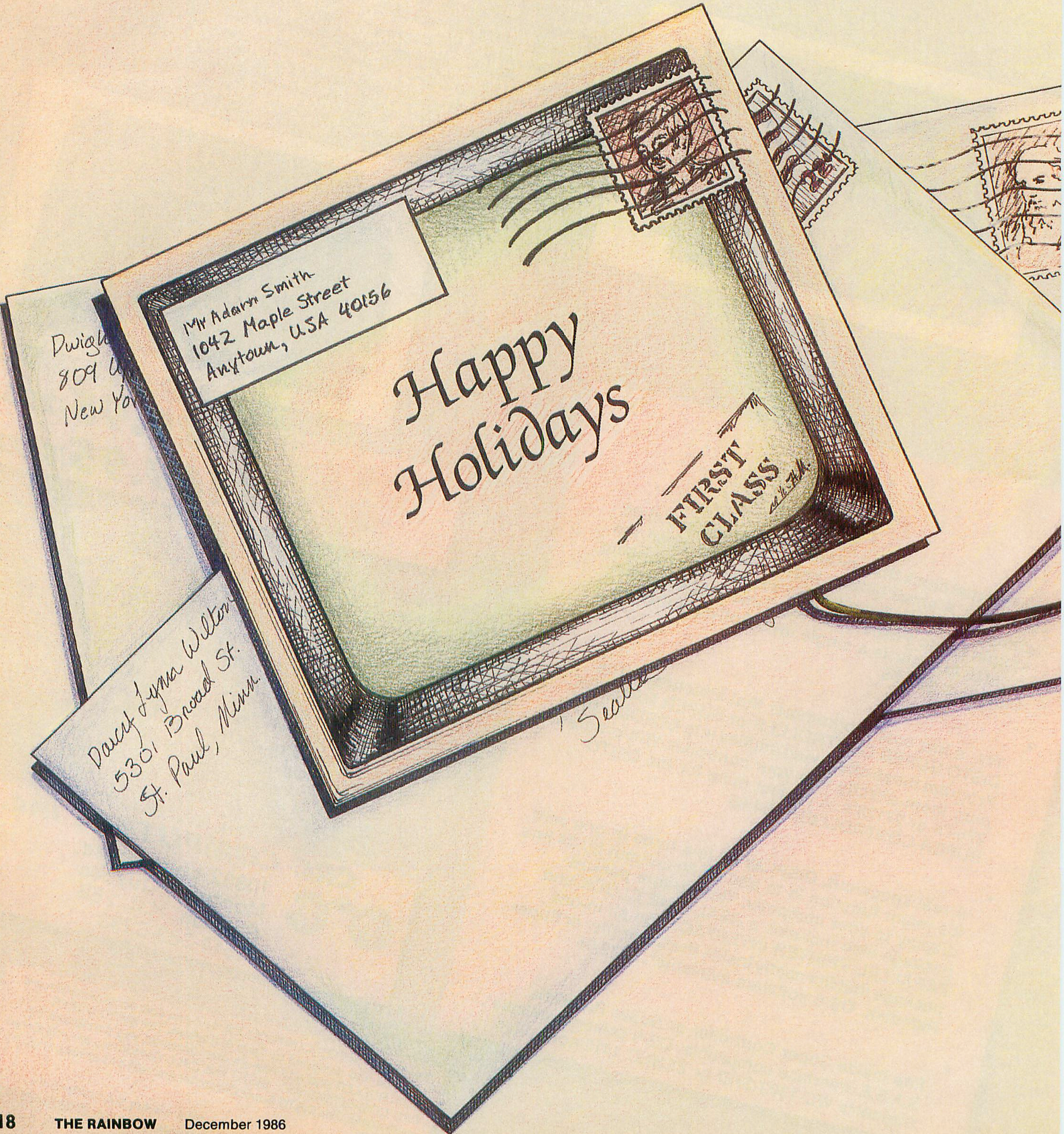
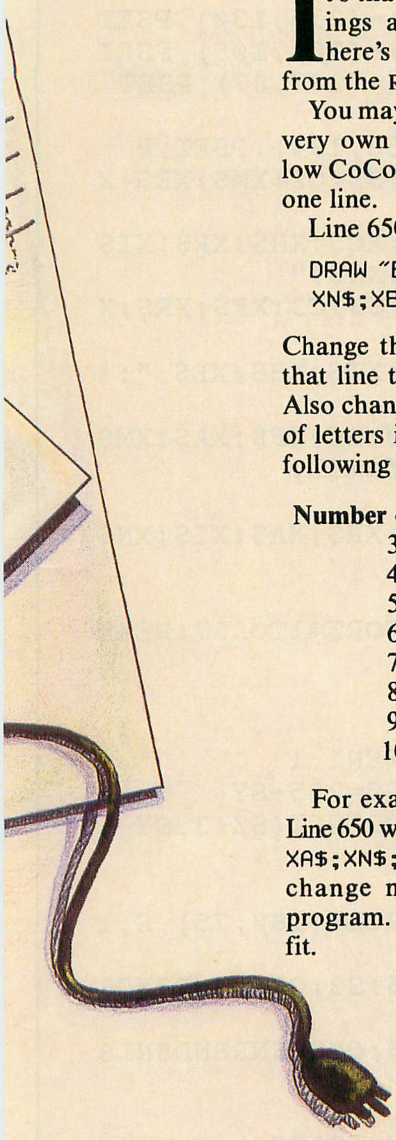
A computerized greeting for you to personalize


Mr Adam Smith
1042 Maple Street
Anytown, USA 40156
Happy Holidays
FIRST CLASS
Dwigh
809
New Yo
Darcy Lynn Wilton
5301 Broad St.
St. Paul, Minn.
Seatt

Season's Greetings

By Eugene Vasconi



It's that time of year for warm greetings and renewed friendships, so here's our special Christmas card from the RAINBOW family.

You may also use the program as your very own personalized greeting to fellow CoCoers. All you need do is change one line.

Line 650 presently reads:

```
DRAW"BM40,92;XR$;XA$;XI$;XN$;XB$;XO$;XW$;"
```

Change the R-A-I-N-B-O-W letters in that line to those of the name desired. Also change the `BM40` to fit the number of letters in the name according to the following chart:

Number of letters	Changes to
3	BM60
4	BM55
5	BM50
6	BM45
7	BM40
8	BM30
9	BM20
10	BM10

For example, if your name is Santa, Line 650 would read: `DRAW"BM50,92;XS$;XA$;XN$;XT$;XA$;"`. This is the only change necessary to customize the program. A maximum of 10 letters will fit.

Hope you enjoy my holiday gift and have a very happy holiday season!

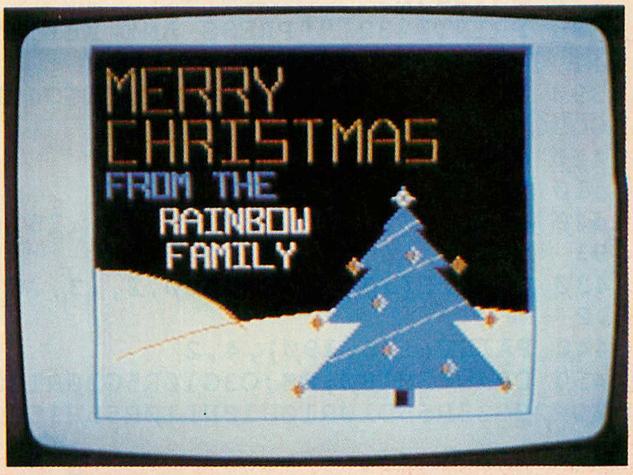
(You may direct questions about this program to the author at 12474 Starcrest #204, San Antonio, TX 78216, 512-496-5783. Please enclose an SASE when writing.) □

Eugene Vasconi is a commercial helicopter pilot in San Antonio, Texas. His computer interests include graphics, music and education. He has been a CoCoer for five years.

280	119
440	131
630	107
840	156
916	70
975	7
END	178

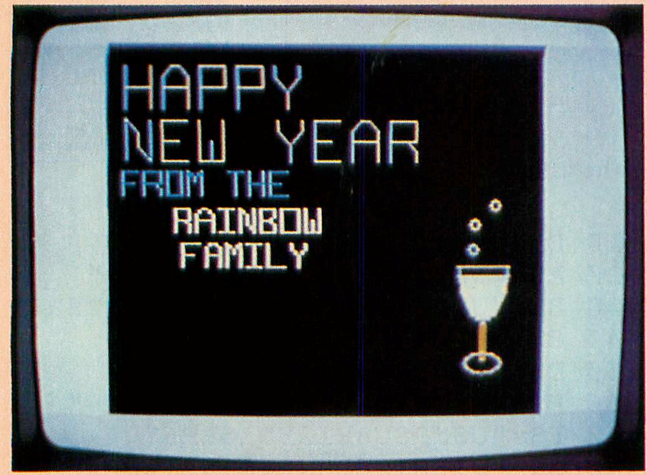
The listing: GREETING

```
10 DIM X(10),Y(10)
20 A$="U12E4R4F4D4NL12D8BR6"
30 B$="U16R12D4G4NL8F4D4NL12BR6"
40 C$="U16R12BD16NL12BR6"
50 D$="U16R8F4D8G4NL8BR10"
60 E$="U8NR8U8R12BD16NL12BR6"
70 F$="U8NR8U8R12BD16BR6"
80 G$="U16R12BD8NL4D8NL12BR6"
90 H$="U8NU8R12NU8D8BR6"
100 I$="R6U16NL6R6BD16NL6BR6"
110 J$="NU4R12NU16BR6"
120 K$="U8NU8R4NE8F8BR6"
130 L$="NU16R12BR6"
140 M$="U16F6ND2E6D16BR6"
150 N$="U16F6D6F6NU16BR6"
160 O$="U16R12D16NL12BR6"
170 P$="U16R12D8NL12BD8BR6"
180 Q$="U16R12D16NL12NH4BR6"
190 R$="U16R12D8L4NL8F4D4BR6"
200 S$="R12U8L12U8R12BD16BR6"
210 T$="BR6U16NL6R6BD16BR6"
```



```
MERRY
CHRISTMAS
FROM THE
RAINBOW
FAMILY
```

```
220 U$="NU16R12NU16BR6"
230 V$="BR6H6U10BR12D10G6BR12"
240 W$="NU16R6NU8R6NU16BR6"
250 X$="E6U4NH6NE6D4F6BR6"
260 Y$="BU16D4F6ND7E6NU4BD12BR6"
270 Z$="NR12U3E12U2NL12BD16BR6"
280 AP$="BU16BR8D4G4BF8BR6"
290 HY$="BU8BR2R8BR2BD8BR6"
300 CLS(3):FORFP=1TO30:PRINT@FP,
CHR$(134+80);:PRINT@FP+480,CHR$(
134+80);:NEXTFP:FORFQ=32TO448STE
P32:PRINT@FQ,CHR$(137+96);:PRINT
@FQ+31,CHR$(137+96);:NEXTFQ
```


HAPPY
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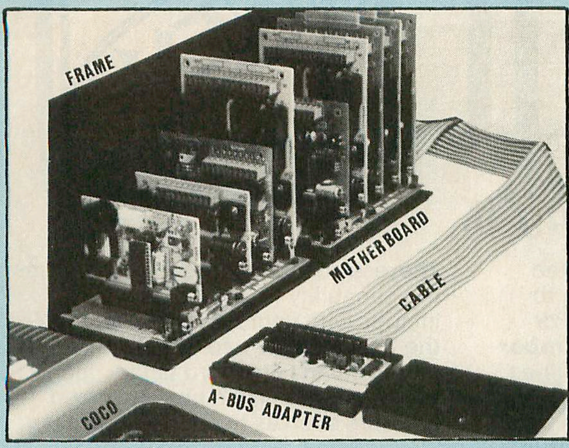
RAINBOW
FAMILY

```
310 POKE359,57:SCREEN0,1:PRINT@6
9,"TWAS THE NIGHT BEFORE ";:PRIN
T@139,"CHRISTMAS ";
320 PRINT@228,"AND NOTHING WAS S
TIRRING ";
330 GOTO410
340 PLAY"T1L8V28O1CC#CC#CC#CC#CC
#"
350 PRINT@358,"EXCEPT THE COMPUT
ER! ";
360 PLAY"T4L16O1GG-FEE-DO2GG-FEE
-DO3GG-FEE-DO4GG-FEE-DO5GG-FEE-D
L12AA#AA#AA#AA#AA#AA#L2A"
370 GOTO490
380 PRINT@232,"[PRESS ANY KEY] "
;
390 PLAY"L200O1CEGO2CEGO3CEGO4CE
GO5CEG"
400 GOTO670
410 PMODE3,1:PCLS
420 CIRCLE(0,170),100,2,.6,.75,.
93
430 CIRCLE(180,195),200,2,.3,.6,
.2
440 PAINT(125,190),4,2
450 DRAW"BM180,80;C3G10R5G20R10G
30R20G35R55D10R10U10NL10R55H35R2
0H30R10H20R5H10"
460 PAINT(180,100),3,3
470 PAINT(178,182),5,3
480 GOTO340
490 COLOR 2
500 FORR=1TO10:READ X(R),Y(R):NE
XTR
510 DATA 165,130,150,110,130,140
,120,175,205,165,210,110,230,140
,240,175,185,105,170,155
520 FORDR=1TO10:FORM=1TO4:CIRCLE
(X(DR),Y(DR)),M:NEXTM,DR
530 POKE359,126:CLS(0):PLAY"O5L3
G"
540 LINE(137,160)-(215,130),PSET
550 LINE(148,126)-(200,105),PSET
560 LINE(165,100)-(187,87),PSET
570 COLOR3
580 LINE(0,0)-(255,194),PSET,B
590 DRAW"BM10,30;S5;C2;XM$;XE$;X
R$;XR$;XY$;"
600 DRAW"BM10,55;XC$;XH$;XR$;XI$
;XS$;XT$;XM$;XA$;XS$;"
610 DRAW"BM10,73;S3;C3;XF$;XR$;X
O$;XM$;"
620 DRAW"BM+15,0;XT$;XH$;XE$;":'
the
630 DRAW"BM45,110;C0;XF$;XA$;XM$
;XI$;XL$;XY$;":'family
640 'insert line
650 DRAW"BM40,92;XR$;XA$;XI$;XN$
;XB$;XO$;XW$;"
660 GOTO380
670 DIMSO$(337):FORZ=1TO337:READ
SO$(Z):NEXTZ
680 EXEC44539
690 DIMZF$(63)
700 PMODE4,1:SCREEN1,1
710 FORSY=3TO75:SZ=255-SY
720 PSET(SZ,SY):PRESET(SZ+3,SY-3
)
730 NEXTSY
740 FORS=1TO4:CIRCLE(180,75),S,1
750 NEXTS
760 DRAW"BM180,75;S3;C1NE7NF7NG7
NH7"
770 DRAW"BM180,75;C0NU8NR8ND8NL8
"
780 REM
790 IF PS=1THEN GOTO900
800 IF ZZ=>337 THEN GOTO820
810 ZZ=ZZ+1:PLAY"T15L8;XSO$(ZZ);
":GOTO850
820 IF FL=55THEN PS=1:GOTO840
830 FL=FL+1:COLOR0,0:LINE(5,FL+5
)-(200,FL+5),PSET:GOTO850
```

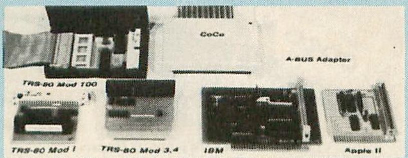
The Amazing A-BUS

What will you do with it?

NEW



An A-BUS system with 2 Motherboards and 9 Cards.



A-BUS Adapters

Special: Complete set of all user's manuals. Typeset, illustrated, with schematics. Only$10

SHEILA wanted to set up a variety of experiments in her lab. With an A-BUS, the computer can watch the mice instead of Sheila.

HARRY has a model railroad layout that he wished to automate. Now his home computer controls the engines, gates, signals, etc. through the A-BUS.

BOB tests electrical fixtures as they leave the assembly line. He develops test equipment quickly with inexpensive, off-the-shelf, and easy to use A-BUS cards.

But what's an A-BUS? It's the easiest way to connect a variety of cards that sense and control anything outside the computer. With the A-BUS, your CoCo becomes an incredible *machine*.

What would I need? First, an *A-BUS Adapter* to convert your computer bus to the A-BUS standard. Then a *Cable* (with one or two slots) to connect one or two A-BUS Cards. If you need more than two cards, the cable will be connected instead to the *A-BUS Motherboard*, which has five slots. Up to five motherboards can be chained. Finally, add you choice of *A-BUS Cards* to fit your project.

I'm not an engineer. Can I use the A-BUS? If you can wire a switch, you can use the A-BUS. No computer hardware knowledge is needed! A screwdriver is all you need for many projects.

What about software? Simple PEEK and POKE commands control the whole system, whether you read the time on the clock, switch the relays, take a temperature reading, or turn a motor.

What if I change computers? Incredibly, this is as simple as replacing the inexpensive adapter card.

CoCo to A-BUS Adapter AR-138: $49

Works with all CoCo's. Plugs into rom slot or Multipak. Disk systems without Multipak need Y-cable ($19.95)

A-BUS adapter for: AApple II, II+, IIe.	AR-134...$49
IBM PC, XT, AT and all compatibles.	AR-133...$69
TRS-80 Models 100, 200.	AR-135...$69
TRS-80 Mod 3,4,4D. Fits 50 pin I/O bus.	AR-132...$49
TRS-80 Model 4P. Includes extra cable.	AR-137...$62
TRS-80 Model I. Plugs into 40 pin I/O bus.	AR-131...$39

A-BUS Motherboard MB-120: $99

Will accomodate five A-BUS cards. A sixth connector allows a second motherboard to be added to the first (with connecting cable CA-161...$12). Up to five motherboards can be joined this way to a single adapter. The motherboard is mounted on a sturdy aluminum frame with card guides.

A-BUS Cable (3 ft.) CA-163: $29

Connects Adapter to 1 A-BUS card or Motherboard.
Special Cable for two A-BUS cards CA-162...$39

Relay Card RE-140: $129

8 industrial relays on board. Contacts are rated at 3 amps. You can control up to 64 cards (512 relays) using several motherboards. Jumpers are used to simply select the card address. The card is easily controlled in BASIC with "OUT" or "POKE". For example, OUT 1,0 turns all the relays off on card #1. Eight LED's show which relays are on.

Digital Input Card IN-141: $49

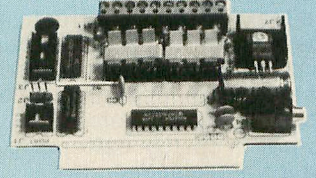
It's safe and easy to connect and read switches, keypads, thermostats, alarm loops, etc. The eight inputs can monitor the presence of voltage or switch position. Simple INP or PEEK commands read the status (On or Off) of the inputs. Each input is optically isolated for convenience and safety.

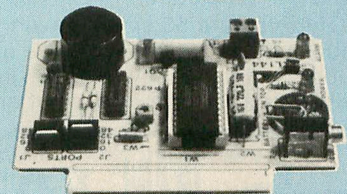
Analog Input Card AD-142:$119

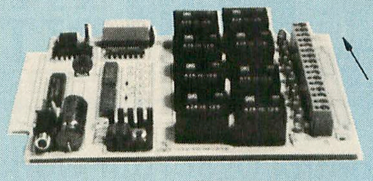
With this 8 bit, 8 channel A/D converter, your computer can read voltages, temperatures, pressures, light levels, etc. Take over 100 readings per second in BASIC (several thousand with machine language). It's simple to use, for example: OUT 1,3 selects channel #3, then A=INP(1) reads the voltage on that channel. Input range: 0 to 5.1V. Resolution: 20mV. Conversion time 120us.

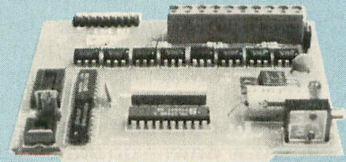
Prototyping Card PR-152: $15

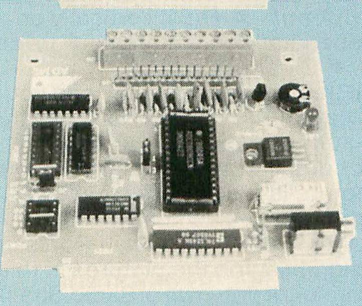
Protocard is 3½ by 4½ in. and accepts up to 10 IC's.











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N.Y. residents add sales tax.
Shipping to Canada is $5.00
Overseas, FPO, APO add 10%

12 Bit A/D Converter AN-146:$109

This high performance analog to digital converter features accuracy to 0.025%, 130ms conversion time, sign and over range indication. The basic input range is −5 to +5 volts, with 1.2mV resolution, but the gain of the on-board amplifier can be set to measure microvolts. Ideal for a strain gauge, thermocouple, pH meter, etc.

Motor Controller ST-143:$69

Stepper Motors are the ultimate in motion control. The special package (below) includes everything you need to get familiar with stepper motors: Each controller card drives **two** stepper motors (12V, bidirectional, 4 phase).

Motor: 48 steps/revolution, 300 steps/second, ¼" shaft: MO-103...$15. Power supply: PS-126...$10

Special Package: the controller card, *two* stepper motors, and power supply: **PA-181...$99**

Clock with Alarm CL-144:$89

It's the most powerful clock/calendar available. The features: • 5 second/month accuracy. • Keeps time, date, and alarm for 5 years (even with computer off). • Can time events down to 1/100 second. • Periodic "chime". • Full time and date alarm. • Four alarm outputs: Computer, LED, Buzzer, and Reed Relay. • Easy to use,: for example H=INP(1) reads the hours, Y=INP(6) reads the year, etc.

Latest Developments

Voice Synthesizer	VS-153
15 Bit Analog to Digital Converter	AD-155
Intelligent Stepper Motor Controller	ST-154
Digital to Analog Converter	DA-147
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Touch Tone® Decoder	PH-145
Counter Timer	CT-154
24 Line TTL Input/Output	DT-148

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CoCo Max™ II

File Edit Goodies Font Style
LIBERTY
NEW

You'll use it all the time and love using it.

What is CoCo Max?

Simply the most incredible graphic and text creation "system" you have ever seen. A Hi-Res Input Pack (more on the pack later) is combined with high speed machine language software. The result will dazzle you.

CoCo Max disk system, with Y-cable.

Is CoCo Max for you?

Anyone who has ever held a pencil or a crayon for fun, school or business will love it. A 4 year-old will have fun doodling, a 15 year-old will do class projects and adults will play with it for hours before starting useful applications (illustrations, cards, artwork, business graphics, flyers, charts, memos, etc.) This is one of the rare packages that will be enjoyed by the whole family.

What made CoCo Max an instant success?

First there's nothing to learn, no syntax to worry about. Even a child who can't read will enjoy CoCo Max. Its power can be unleashed by simply ***pointing*** and ***clicking*** with your mouse or joystick. With ***icons*** and ***pull down menus,*** you control CoCo Max intuitively; it works the same way you think.

Don't be misled by this apparent simplicity. CoCo Max has more power than you thought possible. Its blinding speed will astound you.

It lets you work on an area 3.5 times the size of the window on the screen. It's so friendly that you will easily recover from mistakes: The ***undo*** feature lets you revert to your image prior to the mistake. As usual, it only takes a single click.

Later, we will tell you about the "typesetting" capabilities of CoCo Max II, but first let's glance at a few of its graphic creation tools:

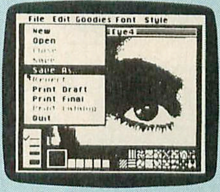
With the ***pencil*** you can draw free hand lines, then use the ***eraser*** to make corrections or changes. For straight lines, the convenient ***rubber-banding*** lets you preview your lines before they are fixed on your picture. It's fun and accurate. Lines can be of any width and made of any color or texture.

The ***paint brush,*** with its 32 selectable brush shapes, will adapt to any job, and make complicated graphics or calligraphy simple.

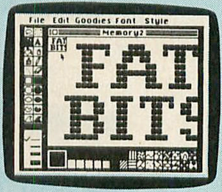
For special effects, the ***spray can*** is really fun: 86 standard colors and textures, all available at a click. It's like the real thing except the paint doesn't drip.

CoCo Max will instantly create many shapes: circles, squares, rectangles (with or without rounded corners), ellipses, etc. Shapes can be filled with any pattern. You can also add hundreds of custom patterns to the 86 which are included.

The ***Glyphics*** are 58 small drawings (symbols, faces, etc.) that can be used as rubber stamps. They're really great for enhancing your work without effort.



Pull down menus



Zoom in!

Control Over Your Work

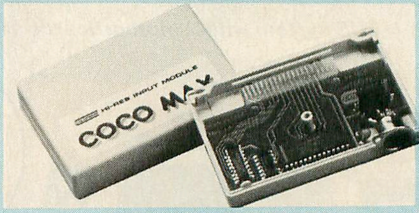
CoCo Max's advanced "tools" let you take any part of the screen, (text or picture) and perform many feats: • You can move it around • Copy it • Shrink or enlarge it in both directions • Save it on the electronic ***Clipbook*** • Flip it vertically or horizontally • Rotate it • Invert it • Clear it, etc. etc.

All this is done instantly, and you can always ***undo*** it if you don't like the results.

For detail work, the ***fat bits*** (zoom) feature is great, giving you easy control over each pixel.

To top it all, CoCo Max II works in color. Imagine the pictures in this ad in color. If you own a Radio Shack CGP-220 or CGP-115, you can even print your work in full color!

There is so much more to say, such as the capability to use CoCo Max images with your BASIC programs, the possibility to use CoCo Max's magic on any standard binary *image* file. There are also many advanced features such as the incredible ***lasso***.



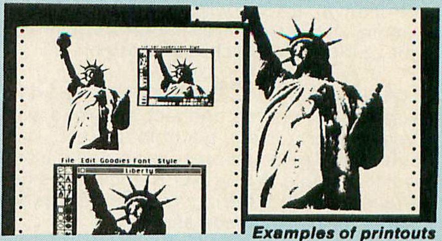
Inside the Hi-Res Input Pack

Why a Hi-Res Input Pack?

Did you know that the CoCo joystick input port can only access 4096 positions (64x64)? That's less than 10% of the Hi-Res screen, which has 49152 points! (256x192). You lose 90% of the potential. The Hi-Res Input Pack distinguishes each of the 49152 distinct joystick or mouse positions. That's the key to CoCo Max's power. The pack plugs into the rom slot (like a rom cartridge). Inside the pack is a high speed multichannel analog to digital converter. Your existing joystick or mouse simply plugs into the back of the Hi-Res Pack.

Electronic Typesetting...

You'll be impressed with CoCo Max's capability. Text can be added and moved around anywhere on the picture. (You can also rotate, invert and flip it...) At a click, you can choose from 14 built in ***fonts*** each with 16 variations. That's over 200 typestyles!


File Edit Goodies Font Style
Liberty

Examples of printouts

Printing Your Creations

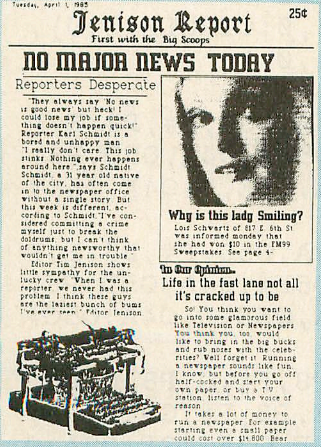
There are a dozen ways to print your work. All are available with a click of your joystick (or mouse) without exiting CoCo Max. Your CoCo Max disk includes drivers for over 30 printers!

All the CoCo Max pictures are **unretouched** screen shots or printouts (Epson RX-80).

CoCo Max II™

The whole family will enjoy CoCo Max. Here are a few examples of the possibilities.

All these pictures are **unretouched** screen photos or printouts (on an Epson RX-80).


Tuesday, April 1, 1985

Jenison Report 25¢

First with the Big Scoops

NO MAJOR NEWS TODAY

Reporters Desperate

"They always say 'No news is good news' but heck! I could lose my job if something doesn't happen quick!" Reporter Karl Schmidt is a bored and unhappy man. "I really don't care. This job stinks. Nothing ever happens around here," says Schmidt. Schmidt, a 31 year old native of the city, has often come in to the newspaper office without a single story. But this week is different, according to Schmidt. "I've considered committing a crime myself just to break the doldrums, but I can't think of anything newsworthy that wouldn't get me in trouble."

Editor Tim Jenison shows little sympathy for the unlucky crew. "When I was a reporter, we never had this problem. I think these guys are the laziest bunch of bums I've ever seen." Editor Jenison

Why is this lady Smiling?

Lois Schwartz of 817 E. 6th St was informed monday that she had won $10 in the FM99 Sweepstakes. See page 4-

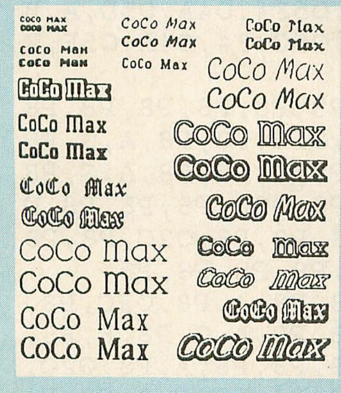
In Our Opinion...

Life in the fast lane not all it's cracked up to be

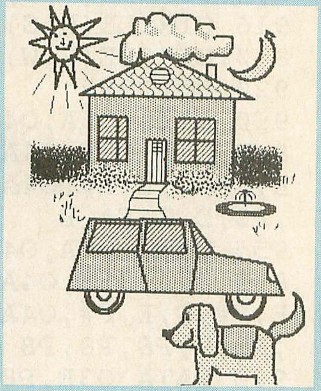
So! You think you want to go into some glamorous field like Television or Newspapers. You think you, too, would like to bring in the big bucks and rub noses with the celebrities? Well forget it. Running a newspaper sounds like fun, I know, but before you go off half-cocked and start your own paper or buy a T.V. station, listen to the voice of reason.

It takes a lot of money to run a newspaper. For example starting even a small paper could cost over $14,800. Bear

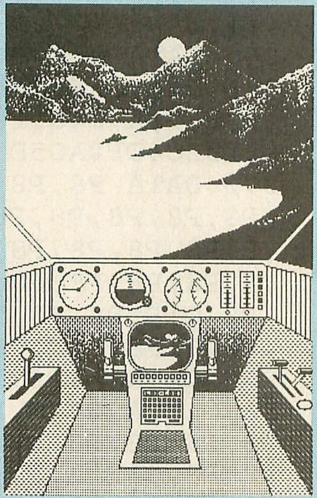
❶ ***Publish a newsletter or bulletin***



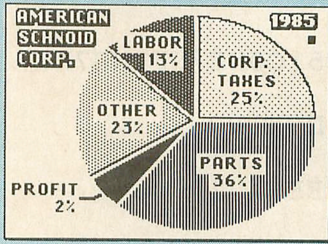
❺ ***Over 200 typestyles to choose from! generate flyers.***



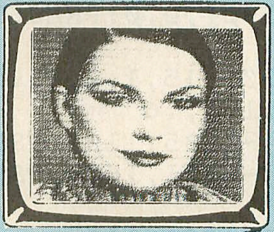
❷ ***Fun for children while stimulating creativity.***



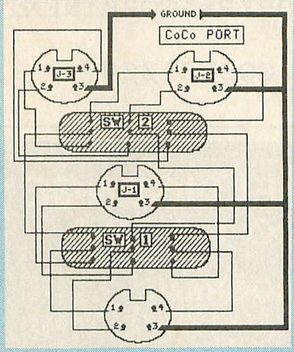
❻ ***A new way to express your imagination.***



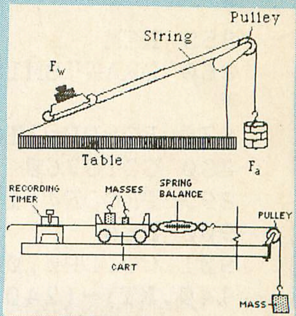
❸ ***Business graphs, charts, diagrams. Also memos***



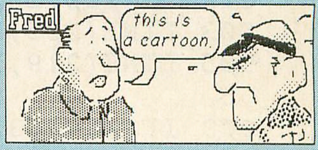
❼ ***Video portrait (with optional digitizer).***



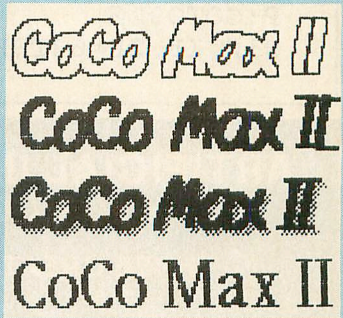
❾ ***schematics and floor plans.***



❹ ***Junior's homework and science projects. Term papers too!***



❽ ***This is a cartoon.***



❿ ***Logos and letterheads.***

System Requirements:

Any 64K CoCo and a standard joystick or mouse. (The koala pad and the track ball work, but are not recommended.)

Disk systems need a Multi-Pak or our Y-Cable. CoCo Max is compatible with any Radio Shack DOS and ADOS.

Note: the tape version of CoCo Max includes almost all the features of CoCo Max II except *Shrink, Stretch, Rotate,* and *Glyphics.* Also, it has 5 fonts instead of 14.

CoCo Max is not compatible with JDOS, DoubleDOS, MDOS, OS-9, the X-pad, and Daisy Wheel Printers.

Printers Supported:

Epson MX, RX, FX and LX series, Gemini, Star, Micronix, Delta 10, 10X, 15, 15X, SG-10, Okidata 82A, 92, 93, C. Itoh Pro-writer, Apple Image-writer, Hewlett-Packard Thinkjet, Radio Shack DMP 100, 105, 110, 120, 200, 400, 500, Line Printer 7, Line Printer 8, TRP-100, CGP-220. (DMP-130 use Line Printer 8), PMC printers, Gorilla Banana.

Color printing: CGP-200, CGP-115

Pricing

CoCo Max on tape with Hi-Res Pack and manual.	$69.95
CoCo Max II (disk only) with Hi-Res Pack and manual.	$79.95
Upgrade: CoCo Max to CoCo Max II New disk and manual	$19.95
New features of CoCo Max II: 14 fonts and glyphic font, dynamic shrink and stretch, rotate, multiple drive capability, 68 page scrapbook, point and click file load, color printer drivers, full error reporting.	
Upgrade: CoCo Max tape to disk manuals, disk and binder	$24.95
Y-Cable: *Special Price*	$19.95
Super Picture Disks #1, #2, and #3 each:	$14.95
All three picture disks	$29.95

Guaranteed Satisfaction
Use CoCo Max for a full month.
If you are not delighted with it, we will refund every penny.

Font Editor Option

A font is a set of characters of a particular style. CoCo Max includes 15 fonts. You can create new fonts of letters, or even symbols or graphics with the font editor. Examples: set of symbols for electronics, foreign alphabets, etc. $19.95

Video Digitizer DS-69

This new Low Cost Digitizer is the next step in sophistication for your CoCo Max system. With the DS-69 you will be able to digitize and bring into CoCo Max a frame from any video source: VCR, tuner, or video camera. Comes complete with detailed manual and C-SEE software on disk. Multi-Pak is required.

New Low Price Save $50	$99.95
New: faster DS-69A	$149.95

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```
840 DRAW"BM12,30;S5;C1;XH$;XA$;X
P$;XP$;XY$;BM12,55;XN$;XE$;XW$;B
M+20,0;XY$;XE$;XA$;XR$;"
850 DRAW"BM180,75;C1NU8NR8ND8NL8
"
855 REM
860 DRAW"BM180,75;C0NE7NF7NG7NH7
"
870 FORPP=1TO30:NEXTPP
880 GOTO760
899 PMODE4,1:SCREEN1,1
900 REM
901 COLOR0,0:FORKT=60TO185:LINE(
140,KT)-(240,KT),PSET:NEXTKT:COL
OR1,0:PAINT(245,190),0,0:PRESET(
139,159)
902 CIRCLE(220,110),15,1,2,0,.5:
CIRCLE(220,162),11,1,.6
903 LINE(205,110)-(235,110),PSET
905 LINE(219,140)-(221,160),PSET
,B
908 IF ZP=>63 THEN GOTO910
909 ZP=ZP+1:READ ZF$(ZP):PLAY"T1
5L8;XZF$(ZP);":FORYP=1TO20:NEXTY
P:GOTO920
910 IF ZP=63THEN GOSUB1000
911 R=RND(20)+210:S=RND(10)+85
912 T=RND(20)+210:U=RND(10)+75
913 V=RND(20)+210:W=RND(10)+95
915 CIRCLE(R,S),3,1:CIRCLE(T,U),
3,1:CIRCLE(V,W),3,1
916 CIRCLE(R,S),3,0:CIRCLE(T,U),
3,0:CIRCLE(V,W),3,0
920 GOTO908
950 DATA O5A,O4A,A,O5G,F#,P8,E,P
8,D,O4A,O5E,O4A,O5F#,O4A,O5D,P8,
E,F#,G,E,F#,O4A,A,O5E,D,O4A,O5C#
,P8,D,G,F#,E
955 DATA O5A,O4A,A,O5G,F#,P8,E,P
8,D,O4A,O5E,O4A,O5F#,O4A,O5D,P8,
E,F#,G,E,F#,O4A,A,O5E,D,O4A,O5C#
,P8,D,P8,P8,P8
960 DATA O3E,P8,P8,F#,G,P8,E,P8,
F#,P8,P8,G,A,P8,E,P8,F#,G#,A,P8,
B,O4C#,D,P8,C#,O2E,O3B,O2E,O3A,G
,F#,E
965 DATA O5A,O4A,A,O5G,F#,P8,E,P
8,D,O4A,O5E,O4A,O5F#,O4A,O5D,A,B
,B,B,B,A,O4G,F#,O5G,F#,O4A,O5E,P
8,L32O4DF#AO5D
970 DATA P8,P8,P8,P8,P8,P8,P8,P8
,P8,P8,P8,P8,P8,O1G,P8,P8,A,G,P8
,E,P8,P8,P8,P8,P8,G,P8,P8,A,G,P8
,E,P8,P8,P8,P8,P8,O2D,P8,P8,P8,D
,P8,O1B,P8,P8,P8,P8,P8,O2C,P8,P8
,P8,C,P8,O1G,P8,P8,P8,P8,P8
975 DATA A,P8,P8,P8,A,P8,O2C,P8,
P8,O1B,A,P8,G,P8,P8,A,G,P8,E,P8,
P8,P8,P8,P8,A,P8,P8,P8,A,P8,O2C,
P8,P8,O1B,A,P8,G,P8,P8,A,G,P8,E,
P8,P8,P8,P8,P8,O2D,P8,P8,P8,D,P8
,F,P8,P8,D,O1B,P8,O2C,P8,P8,P8,P
8,P8,E,P8,P8,P8,P8,P8
980 DATA C,P8,O1G,P8,E,P8,G,P8,P
8,F,D,P8,C,E,G,C,E,G,L32CGO2CEGO
3C
985 DATA P8,P8,P8,P8,P8,P8,P8,P8
,P8,P8,P8,P8,P8,O4E,P8,A,P8,A,B,
A,G#,F#,P8,F#,P8,F#,P8,B,P8,B,O5
C#,O4B,A,G#,P8,E,P8,E,P8,O5C#,P8
,C#,D,C#,O4B,A,P8,F#,P8,E,E,F#,P
8,B,P8,G#,P8,L32AC#EO5A,P8,O1A
990 DATA O2G,P8,O3C,P8,P8,C,C,P8
,E,P8,D,P8,P8,C,D,P8,E,D,C,P8,P8
,C,E,P8,G,P8,A,P8,P8,P8,P8,P8,A,
P8,G,P8,P8,E,E,P8,C,P8,D,P8,P8,C
,D,P8,E,D,C,P8,P8,O2A,A,P8,G,P8,
O3C,O2C,E,G,O3CEGO4C
1000 COLOR1,1:LINE(205,115)-(235
,115),PSET
1010 PAINT(220,138),1,1:ZP=65
1020 RETURN
```

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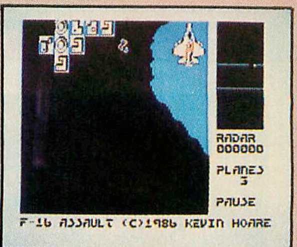
Rainbow's Holiday Shopping Guide

Making a list? Checking it twice? Well, if Santa's helpers aren't in tune with the care and gifting of the family CoCo nut, maybe we can help.

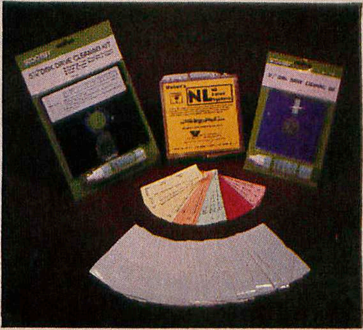
The Rainbow editors, right here in the CoCoLand toy store, have gathered a selection of gift items sure to tickle the CoCo lover at your house.

From stocking stuffers to the "big" gift idea, we think these are bound to please.

(For ordering information on these holiday gift selections, see Page 174.)



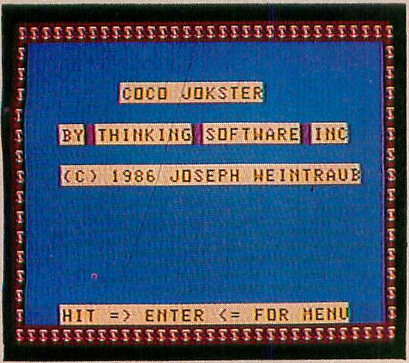
"Any landing you walk away from is a good landing." Get them before they get you with *Mission: F-16 Assault*, Diecom Products, $28.95; $38.95 Cnd.



Finding that favorite program is easy as 1-2-3 with the No Label System from Weber and Sons, $22.45. Also, prolong the life of favorite programs with Disk Cleaning Sets, Ohm Electronics. 3½", $7.95; 5¼", $6.95.

Try your hand at the "big one" and see if you can beat the galvanic skin response detector used in the Bio Detector from Computerware, $24.95.

Rainbow editorial assistant Angela Kapfhammer gives the WICO Trackball a spin while designer Sandy Underwood waits for a turn. From Zebra Systems, $19.95.



```
COCO JOKESTER

BY THINKING SOFTWARE INC

(C) 1986 JOSEPH WEINTRAUB

HIT => ENTER <= FOR MENU
```

For software that produces "one-liners," try *CoCo Jokester*, a barrage of humor to brighten any CoCo nut's screen. From Thinking Software, Inc., $26.95.

Handicapper!

For a winning place in the show, put your money on *The Handicappers*. Separate programs for thoroughbreds, harness horses and greyhounds. Federal Hill Software, $39.95 each; $59.95 any two; $79.95 all three.

Senior editor Kevin Nickols easily installs an HJL-57 Keyboard Kit-2 for a professional keyboard touch. HJL Products, $89.95.

Howard Medical suggests this Zenith Green Screen Monitor with Hi-Res graphics and 15 MHz band width for $67.50. Monitor stand also available for $39.50.

ADVENTURES
OS-9
THE COMPLETE RAINBOW GUIDE TO
OS-9
RAINBOW

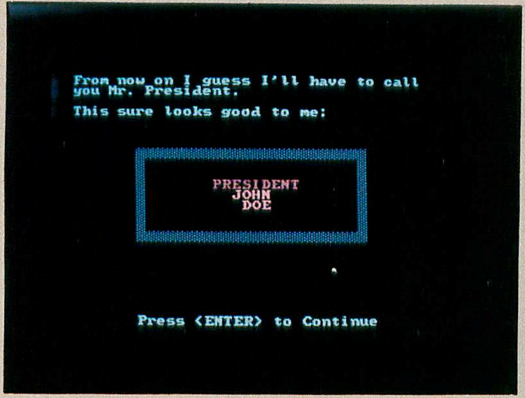
Let the light of the season shine throughout the year with a subscription to THE RAINBOW, RAINBOW ON DISK or RAINBOW ON TAPE. Other gift ideas from Falsoft, Inc., include magazine binders and selections from the Rainbow Bookshelf.

Laurence Tepolt's *Assembly Language Programming for the TRS-80 Color Computer* is ideal for the serious CoCo user. From Tepco, $16 (beginning Jan. 1, $18). Any Adventurer would appreciate *20 Solved Adventures* Volumes 1 and 2 from Lomiq, $8; $10 Cnd. each.

SEIKOSHA
SP-1000A
HOMEWARE
DISKMAN
TIME MASTER

Cinsoft offers the inexpensive Seikosha SP-1000A dot matrix printer as a complement to any computer system, $209. Utility programs from Tothian Software include *Homeware*, $19.95; *Diskman*, $21.95; and *Time Master*, $19.95 ($49.95 whole set)

Personalize your gift giving with CoCo graphics and printer transfer paper from Foto-Wear, $8.95 (4 pack); $19.95 (10 pack). Add color to graphics creations with Underware Ribbons and Color Pens from Diversions. Ribbons range from $14.95 to $21.95; Color Pens, $14.95.

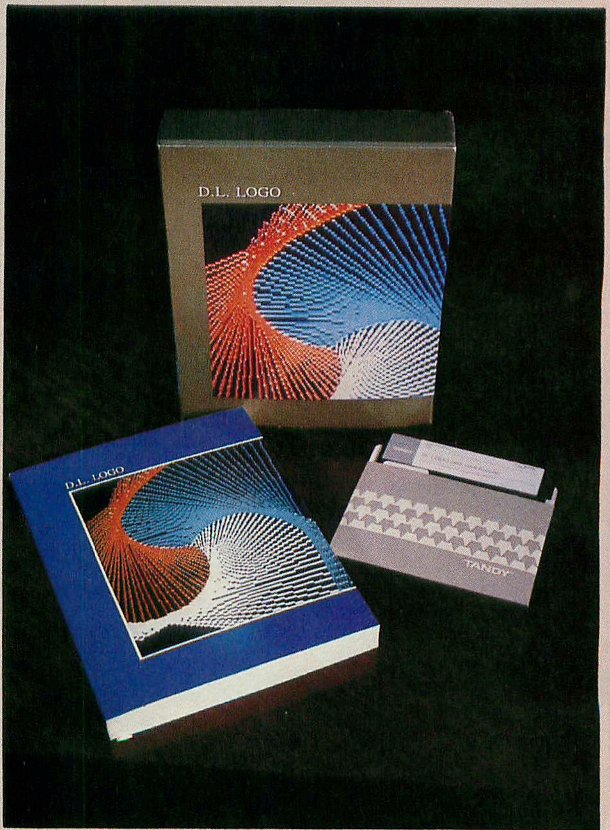


```
From now on I guess I'll have to call
you Mr. President.
This sure looks good to me:

                PRESIDENT
                  JOHN
                   DOE

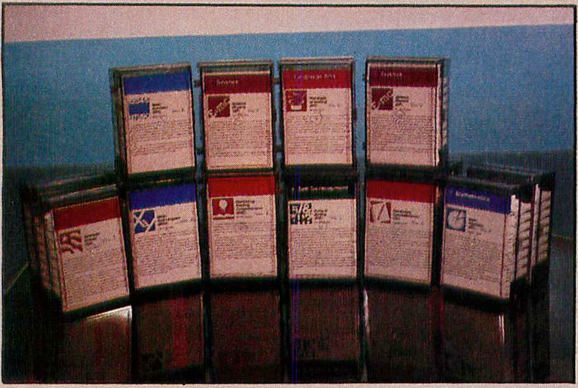
        Press <ENTER> to Continue
```

"If I were president, I'd . . . ." You make decisions and you run the country with *Congress*, from B5 Software, $29.95.



You can talk in Dale Lear's language! Based on M.I.T.'s LOGO, *D.L. LOGO* is a programming language designed to run under OS-9. Radio Shack stores nationwide.

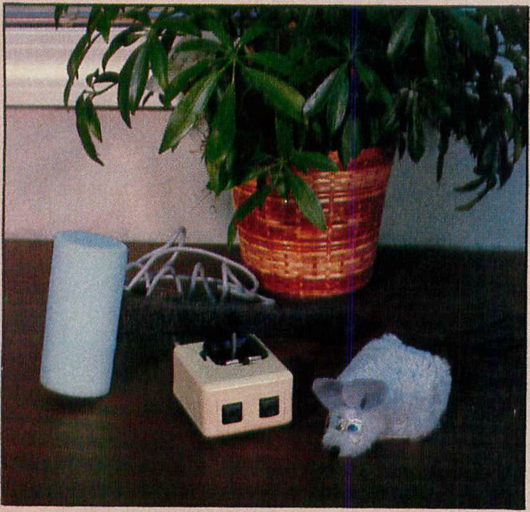
Here's an add-on you can subtract on, too! Beverly Bearden, in Rainbow's business division, multiplies the CoCo's usefulness with HJL's Numberjack, $89.95.



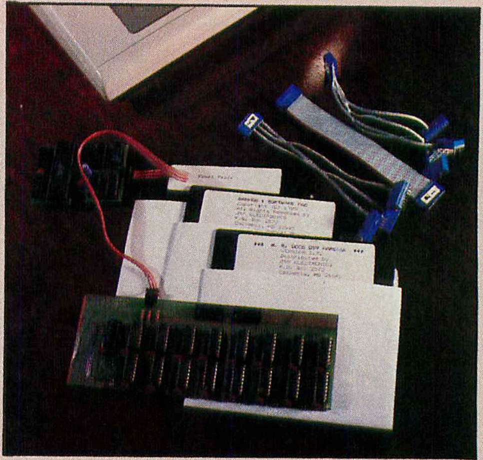
These stocking stuffers can help your children sharpen basic skills. Educational software from York 10, $49.95 per volume of eight cassettes.

Avatex 1200

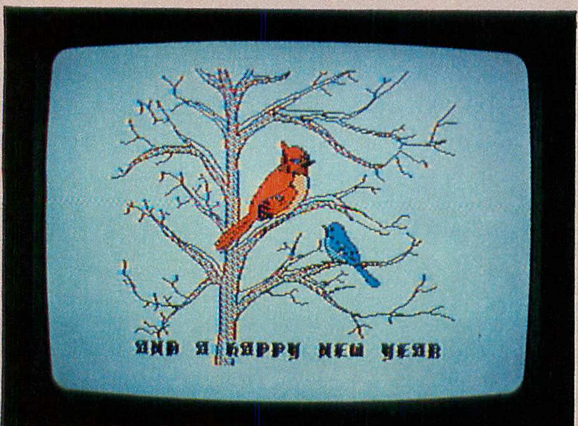
The bargain-priced Avatex 1200 baud modem opens up a whole new "online" world. From Spectrum Projects, $129.95.



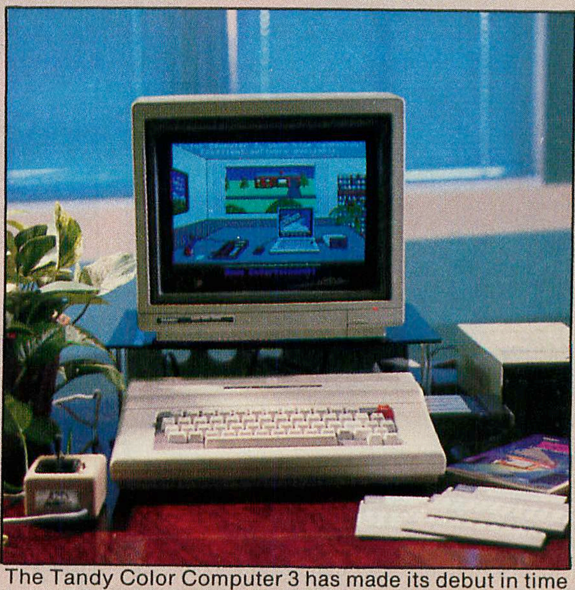
Delight your favorite CoCoist with the MouseTop from H&H Enterprises, $5.95. From The Lyter Side, this foam rubber Computer Hammer adds a touch of humor $8.95. The A2D Deluxe two-button joystick puts the action in the palm of your hand, works with the CoCo 3 and is available from Cinsoft, $29.95.



If your gift is for someone hardware oriented, consider the Banker II memory expansion board. J & R Electronics, from $39.95 to $169.95.



Fantasia II brings the spirit of the holiday season to life with graphics and music. From Speech Systems, $19.95.



The Tandy Color Computer 3 has made its debut in time for holiday giving, and Radio Shack's new CM-8 analog RGB color monitor is what is needed to maximize its potential. Radio Shack stores nationwide.

(For ordering information on these holiday gift selections, see Page 174.)

16K
ECB

RAINBOW ON DISK

Mission: Hold the Bridge

By Charles Farris

During World War II, your paratrooper battalion is dropped behind enemy lines to capture several bridges along the Rhine River. Unfortunately, your battalion runs into a Panzer division at one bridge. After a short battle, your battalion retreats. In the confusion, you become separated from the battalion, finding yourself at the far end of the bridge. Looking back across the bridge, you see the German tanks start up to pursue your fleeing battalion. After finding an abandoned mortar hidden in the bushes, you prepare to meet the enemy. As the first tank rolls onto the bridge, you fire.

Mortar Command is a 16K ECB program requiring one joystick plugged into the right port. Control the angle of the mortar by moving the joystick horizontally. Moving the joystick to the right decreases the angle of the mortar while moving it to the left increases the angle. The maximum angle is 85 degrees and the minimum angle is 45 degrees. Pushing the button fires the mortar.

The tanks that roll across the bridge come in waves of six. The speed of the tank is controlled by its placement in the wave. The first tank moves very slowly, the second a little bit faster and so on until the last tank in the wave crosses, moving very fast. Once the sixth tank is destroyed, the next wave begins.

There are two ways to destroy the tanks. One is to hit them with your mortar shells. A hit anywhere on the tank destroys it. The second way is to let the tank roll over your ammo, which is in front of your mortar, and blow up. The only problem with this method is that you lose a life. Every time you destroy a tank with your mortar, a small swastika is drawn in the score box at the top of the screen. You only get a swastika if you hit the tank with a shell. Allowing the tank to run over your ammo does not count as a "kill" and you will not get a swastika. After destroying 36 tanks, a glider will fly down and land on the bridge, signaling that you have won the game. Also, for every 10 tanks you destroy, you get an extra man.

Upon running the game, you are asked if you want to use the high speed poke (`POKE 65495,0`). If your computer cannot take this poke, delete lines 6 through 9. After you have selected `YES` or `NO`, the title screen is drawn. Pushing the firebutton starts the game. After you lose all your men, the words `GAME OVER` are displayed and the triumphant German tanks roll across the bridge at high speed. Pushing the firebutton restarts

---

Charles Farris is a student at AFCENT High School in Brunssum, the Netherlands. He has had his CoCo 2 for four years and enjoys programming in BASIC.

the game. Pressing the space bar returns the computer to normal speed if you selected the high speed poke and ends the program. Be sure when you type in the program that the poke in Line 365 is `POKE 65494,0` and not `POKE 65495,0`.

Line changes for playing the game on the keyboard are listed at the end of the article. The use of the high speed poke can be chosen at the beginning of the game. The game is best played on a monitor, since the artifact colors in `PMODE 4,1:SCREEN 1,1` make the ground look striped. To fix this, change the command `SCREEN 1,1` in Line 175 to `SCREEN 1,0`. The ground will still look striped, but it will look better than before. On a monitor, the ground is not striped, but black speckled with white dots.

The program uses a sine wave to plot the course of the shell. The routine for that is located in lines 115 through 160 and accessed from Line 60. The angle of the mortar is controlled from lines 55 through 75. The tanks are controlled from lines 90 through 110. The tanks' coordinates are defined in lines 190 through 215. The background is drawn in lines 285 through 340. The score box and scoring is done in lines 385 through 430. The routine for determining whether or not a tank is hit by a shell is found in lines 250 through 255, and the tank is destroyed in lines 260 through 280. The other parts of the program not mentioned here are labeled with remark statements for easy access.

Most of the graphics are done with `DRAW` statements, such as the tanks, glider, score box, swastikas, and the lettering in the title screen, game-over sign, and end-of-the-game graphics. The bridge was done using the `LINE` command, the river with `CIRCLE` commands, the banks with the `PRESET` command.

The hardest part of the program to develop was explosions. I put the tank array that I defined with `GET` in Line 185 onto a smaller area. The computer, confronted with this problem, mashes the picture in order to fit it into the smaller area. By using a `FOR-NEXT` loop to slowly decrease the size of the `PUT` area, the tank seems to blow apart while in reality, it is being squashed together. An interesting explosion happens when the computer only decreases the `PUT` area by one pixel. The tank appears to be blown off its treads.

When I wrote the bridge graphics, I did not know that you can use the bridge pylons as sights. The mortar shells will either land on the pylons or in the blank spaces on the bridge between them. The last two tanks in every wave move extremely fast and you will be able to get only one shot in, so wait till they get on the bridge, then shoot straight up. The shot should catch them just before they roll over you. Experiment to find the right setting and time to fire.

Change the `M=M-1` in Line 95 to `M=M-0` for more lives.

For those without joysticks, I have included a list of line changes for converting the game to keyboard control. They are:

```
55  A$=INKEY$
60  IF A$=CHR$(32) THEN MF=1
65  IF A$=CHR$(8) THEN LINE(0,170)
    -(C,D),PSET:C=C-1:IF C<1
    THEN C=1
70  IF A$=CHR$(9) THEN LINE(0,170)
    -(C,D),PSET:C=C+1:IF C>10
    THEN C=10
245 IF INKEY$=CHR$(32) THEN
    PCLS5:GOTO 285 ELSE GOTO 240
360 IF INKEY$=CHR$(32) THEN
    RE=0:K=0:GOTO 20
365 IF INKEY$="E" THEN POKE
    65494,0:STOP
550 IF INKEY$=CHR$(32) THEN 9
    ELSE 550
```

These changes will enable you to control the angle of the mortar with the right- and left-arrow keys. The space bar becomes the firebutton. When the `GAME OVER` sign appears, the E key stops the game and returns the speed to normal. The space performs as the firebutton for all other functions.

If you have any questions concerning the game, send an SASE with your questions to me at P.O. Box 582, 1141 USAFSAS Det 2, APO, NY 09011. If you live in Europe, send the SASE to Eindstraat 15, 6451 AA Schinveld, the Netherlands.

Have fun and good luck! ☐

65	126
160	251
235	81
295	91
370	143
440	211
480	164
END	0

The listing: MORTAR

```
0 REM *****************
1 REM * MORTAR COMMAND *
2 REM *       BY       *
3 REM * CHARLES FARRIS *
4 REM *****************
5 ' HIGH SPEED POKE (Y/N)
6 CLS0:PRINT@33*8,"high"+CHR$(12
8)+"speed"+CHR$(128)+"poke";
7 PRINT@302,"y"+CHR$(128)+"n";
8 IF INKEY$="Y" THEN POKE 65495,
0:GOTO 9 ELSE IF INKEY$="N" THEN
 POKE 65494,0:GOTO 9 ELSE GOTO 8
9 REM
10 SS=1
15 DIM T(43),TX(10),TR(78)
20 GOTO 170
25 RE=0:C=10:D=160:TY=157:WT=1:M
=3:TS=1:K=0:L=0
30 ' DRAW MEN LEFT
35 IF M=0 THEN C=0:GOTO 350 ELSE
 FOR G=1 TO M:L=L+10:DRAW"S4BM"+
STR$(L)+",191C0URE2G2RDL2":NEXT
G:L=0
40 DRAW"C5"
45 ' MAIN PROGRAM
50 A=JOYSTK(0):B=JOYSTK(1)
55 IF PEEK(65280)=126 OR PEEK(65
280)=254 THEN MF=1
60 IF A=0 THEN  LINE(0,170)-(C,D
),PSET:C=C-1:IF C<1 THEN C=1
65 IF A=63 THEN LINE(0,170)-(C,D
),PSET:C=C+1:IF C>10 THEN C=10
```

```
70 MA=C*50
75 COLOR 5,0:LINE(0,170)-(C,D),P
RESET
80 CIRCLE(0,170),5,0
85 ' TANK MOVEMENT
90 IF WT=6 THEN RE=1:WT=1:GOSUB1
90
95 PUT(TX(WT),TY)-(TX(WT)+26,TY+
12),T,PSET
100 TX(WT)=TX(WT)-TS:IF TX(WT)<=
0 THEN TX(WT)=0:M=M-1:TS=WT:GOTO
 260
105 IF MF=1 THEN GOTO 110 ELSE I
F MF=0 THEN 50
110 ' FIRE ROUTINE
115 X=X+6
120 H=0+X*MA/360
125 V=160-SIN(X/57.29578)*(160/2
)
130 H=INT(H):V=INT(V)
135 PSET(H1,V1,5)
140 PRESET(H,V)
145 IF V>161 THEN X=0:PSET(H,V,5
):MF=0:GOTO 250
150 H1=H:V1=V
155 GOTO 90
160 GOTO 160
165 ' DRAW, DEFINE, & GET TANK
170 PMODE 4,1:PCLS 5:SCREEN 1,1
175 DRAW"BM50,50C0S4R7ER4FDGL4HU
BD2RL4GLG2E2RDLGDFR15EUHL15R14UR
F2H2LHL4BDBR5BL14BDRFDGR4HUERFDG
R3HUERFDGR4HUEC5
180 GET(50,45)-(76,57),T,G
185 ' SET UP TANK X COORDINATES
190 TX(1)=255+6
195 FOR N=2 TO 7
200 TX(N)=TX(N-1)+20
205 NEXT N
210 IF RE=1 THEN RE=0:RETURN  EL
SE 220
215 REM 'SOFTWARE CO. TITLE
220 IF SS=1 THEN PCLS5:GOTO 225
ELSE IF SS=0 THEN PCLS5:GOTO 285
225 FORC=1TO20STEP3:LINE(0+C,0+C
)-(255-C,191-C),PRESET,B:NEXT C:
DRAW"C0S24BM30,50U3R3D3L3U3BFDRU
LRBEBRD2FREU2LD2LU2LBR4R3DL2RDLR
2DL3U3R3BRR2FGFLHDLU3RBDRBR2BUR3
DL2R2D2L3UR2L2U2BR4R3DL2RDLR2DL3
U3R3BRBDD2RURDRU2HLGBRRBEBRR3DL2
R2D2L3UR2L2U2"
230 DRAW"BM30,55R3DL2R2D2L3UR2L2
U2R3BRR3D3L3U3BFDRULBUBR3R3DL2RD
LDLU3R3BRR3DLD2LU2LUR3BRD3ERFU3L
DLULBR4BDD2RURDRU2HLGBRRBR2UR2FG
FLHDLU2BRRBUBR2R3DL2RDLR2DL3U3"
235 DRAW"S16BM80,140R2DL2DU2BR3R
2DLFHLDU2BR3R2L2DRLDR2BRR2UL2UR2
BRR2L2DRLDR2BRU2F2U2BRR2LD2BR2R2
UL2UR2"
240 IF PEEK(65280)=126 OR PEEK(6
5280)=254 THEN PCLS5:GOTO 285 EL
SE 240
245 ' HIT OR MISS ROUTINE
250 IF H>TX(WT) AND H<TX(WT)+26
THEN K=K+1:GOTO 260 ELSE FOR Y=1
 TO 4:CIRCLE(H,V),Y,0,1,.5,1:NEX
T Y:MF=0:FORY=1 TO 4:CIRCLE(H,V)
,Y,5,1,.5,1:NEXT Y:MF=0:X=0:GOTO
 50
255 ' DESTROY TANK
260 FOR B=1 TO RND(6):PUT(TX(WT)
,TY)-(TX(WT)+26-B,TY+12-B),T,PSE
T:NEXT B:IF TX(WT)=0 THEN LINE(0
,188)-(63,191),PSET,BF:LINE(TX(W
T),TY)-(TX(WT)+26,TY+12),PSET,BF
265 TS=WT:SS=0
270 TX(WT)=255:SS=0:WT=WT+1:GOSU
B 385
275 GOTO 35
280 ' DRAW RIVER,BANKS, & BRIDGE
285 Y=170:L=15
290 L1=255-L
295 FOR X=1 TO L STEP 2:PSET(X,Y
,0):NEXT X:FOR X=L1 TO 255 STEP
2:L1=255-L:PSET(X,Y,0):NEXT X:Y=
```

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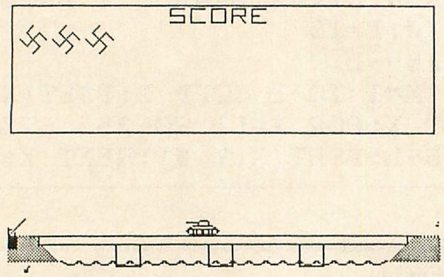
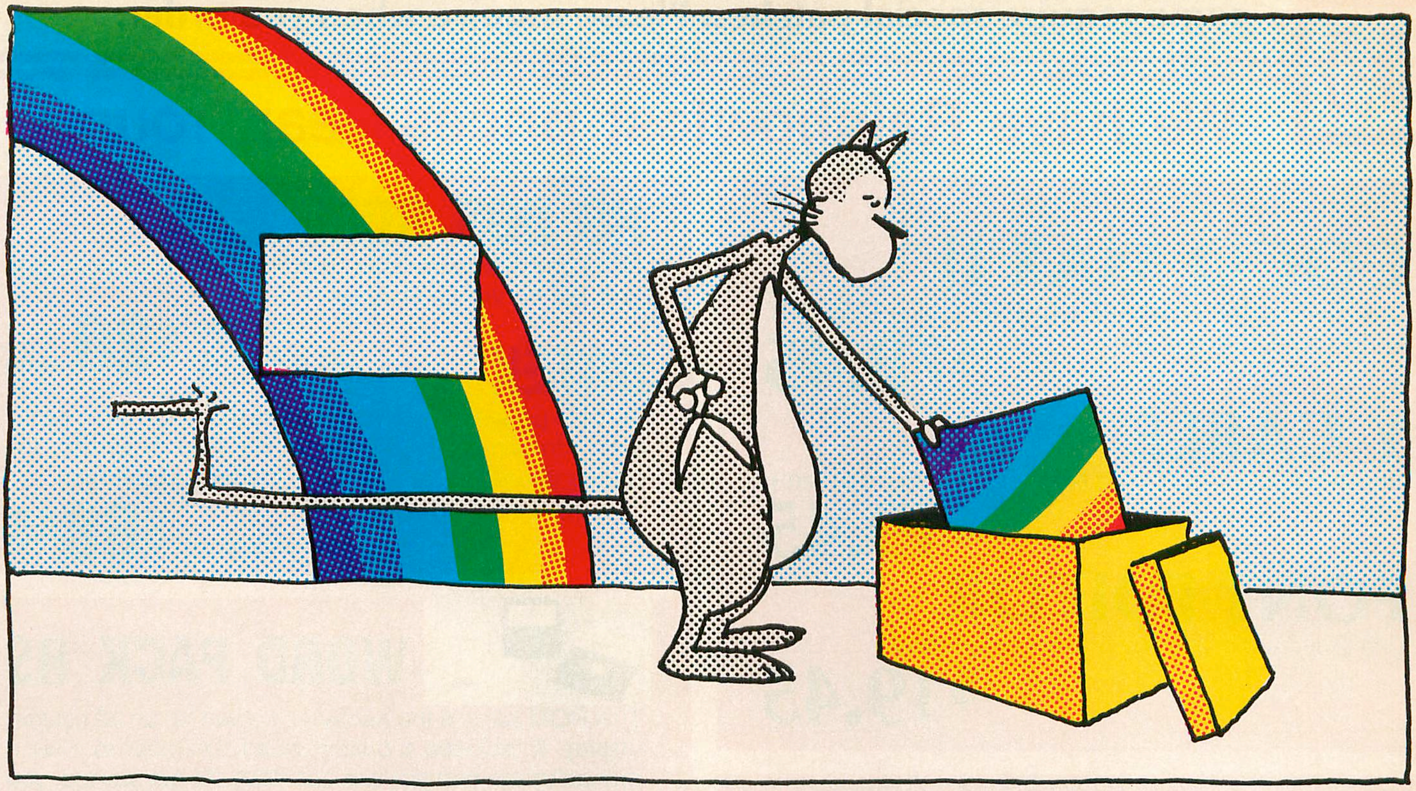
```
Y+1:L=L+1:IF Y=186 THEN 305 ELSE
 FOR X=0 TO L STEP 2:PSET(X,Y,0)
:NEXT X:FOR X=L1 TO 255 STEP 2:L
1=255-L:PSET(X,Y,0):NEXT X:Y=Y+1
:L=L+1
300 IF Y=186 THEN 305 ELSE 295
305 LINE(0,170)-(5,177),PRESET,B
F
310 FORB=38 TO 224 STEP 10:CIRCL
E(B,185),6,0,.41,1,.5
315 NEXT B:O=0
320 LINE(19,170)-(236,175),PRESE
T,B:LINE(19,170)-(14,170),PRESET
:LINE(236,170)-(243,170),PRESET
325 FOR X=45 TO 224 STEP 27:O=O+
1:IF O=2 OR O=4 OR O=6 THEN LINE
(X-7,175)-(X+7,188),PRESET,B:NEX
T X
330 NEXT X
335 GOSUB 385
340 X=0:GOTO 25
345 ' GAME OVER
```



```
350 X=50:Y=50
355 DRAW"S20BM50,90C0L3D3R3ULBR2
DU2ERFD2UL3R3BFU3M+1,+2RM+1,-2D3
BRR3L3URLU2R3BR6R3D3L3U3R3BRM+1,
+3RM+1,-3BRR3L3D2RLDR3BRU3R3D2L2
FHL"
360 IF PEEK(65280)=126 OR PEEK(6
5280)=254 THEN RE=0:K=0:GOTO 20
365 IF INKEY$=CHR$(32) THEN POKE
 65494,0:STOP
370 IF SS=0 THEN 460
375 GOTO 360
380 ' SCORE BOX GRAPHICS
385 IF SS=1 THEN 430 ELSE IF K=1
0 OR K=20 OR K=30 THEN M=M+1:GOT
O 390 ELSE IF K=36 THEN 475
390 LINE(0,0)-(250,75),PRESET,B:
DRAW"C0BM95,10;S16R2UL2UR2BRR2L2
D2R2BRR2U2L2D2R2BRU2R2DL2RFBRR2L
2URLUR2"
395 F=5:LV=20
400 FOR KI=1 TO K:IF F>240 THEN
F=5:LV=LV+20
405 IF K=0 THEN RETURN
410 DRAW"S8C0BM"+STR$(F)+","+STR
$(LV)+"F2E4F2BL4F2G2BU8G2F2"
415 F=F+20
420 NEXT KI
425 RETURN
430 ' TITLE SCREEN
435 DRAW"S24C0BM22,50U5RFRERD5LU
4GLHD4LBR7R3EU3HL3GD3FBU2UERFDGL
HBM+5,+2U5R4FDGLFRDLH2LD2LBU3BRR
3UL3DBF3BR4RLU4L2UR5DL2D4BR3U3E2
RF2D3LUL3DLRBU2UERFDL3R3BRBD2BRU
5R4FDGLFRDLH2LD2LBU3BRR3UL3D"
440 DRAW"BM4,90BRR3L3HU3ER3FDLUL
2GDFR2URDGBR3R3EU3HL3GD3FBEREUHL
GDFBR4BDU5RFRERD5LU4GLHD4LBR6U5R
FRERD5LU4GLHD4LBR6U3E2RF2D3LUL3D
LRBU2UERFDL3BR5BD2U5RF3U3RD5LUH3
D4LBR6U5R3F2DG2L3RBUU3R2FDGL2"
445 DRAW"BM80,120S16U2FED2BRR2LU
2LR2BRR2L2DR2DL2BR3R2UL2UR2BRR2L
D2LR2BRR2U2L2D2R2BRU2F2U2BRBDR2
450 DRAW"BM33,140U2DR2UD2BRR2U2L
2D2R2BRU2D2R2BRREHLD2BR6U2LR2BRD
2UR2UD2BRR2L2URLUR2BR4BD2R2U2L2D
2R2ULRBFU2R2DL2RFBRR2LU2LR2BRRFG
LU2BR3R2L2D2R2ULRBDBRR2L2URLUR2C
5"
455 SS=0:TX(1)=255:TY=157
460 DRAW"C5":TX(1)=TX(1)-6:IF TX
(1)<=0 THEN LINE(0,TY)-(TX(1)+26
,TY+12),PSET,BF:GOTO 455
465 PUT(TX(1),TY)-(TX(1)+26,TY+1
2),T,PSET
470 GOTO 360
475 ' GLIDER DRAWN AND DEFINED
480 DRAW"S12C0BM128,96E2R3M+4,+1
M+1,-2RD2GM-5,+1L3M-2,-1R2U2DLDB
R2ERM+2,+1BR3BUR2L2BDBL3L4C5"
485 GET(128,85)-(170,99),TR,G
490 LINE(128,85)-(170,99),PSET,B
F
495 X=230:Y=96
500 ' LAND GLIDER ON BRIDGE
505 IF Y=155 THEN 525 ELSE 510
510 X=X-3:Y=Y+1
515 PUT(X,Y)-(X+42,Y+14),TR,PSET
520 GOTO 500
525 X=X-1:PUT(X,Y)-(X+42,Y+14),T
R,PSET:IF X=10 THEN 540
530 GOTO 525
535 ' END OF GAME GRAPHICS
540 DRAW"BM60,120S20C0U2R2L2D2R2
ULRDBRU2R2D2L2R2BRU2R2D2L2R2BRU2
RFGLBR5U2D2EFU2BRR2D2L2U2R2BRD2U
2R2DL2RFBRU2DM+2,-1BD2M-2,-1"
545 DRAW"BM25,140U2FED2BRR2U2L2D
2R2BRU2R2DL2RFBR2U2LR2BRBDDUEFDU
L2R2BRBDU2R2DL2RFBR4R2L2U2R2BRR2
D2L2U2R2BRD2U2FED2BRU2FED2BRUEFD
UL2R2BDBRU2F2U2BRRFGLU2"
550 IF PEEK(65280)=126 OR PEEK(6
5280)=254 THEN 9 ELSE 550
```



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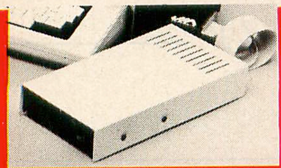

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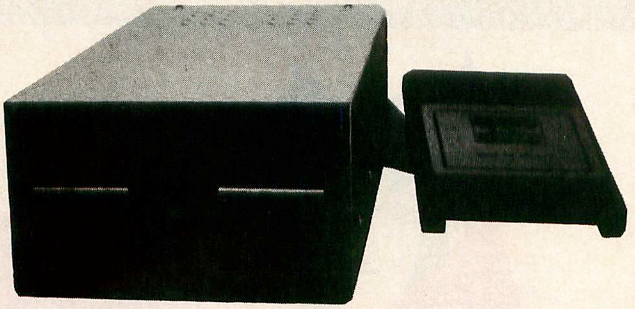

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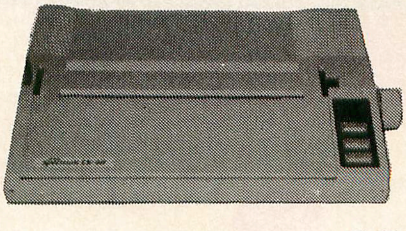

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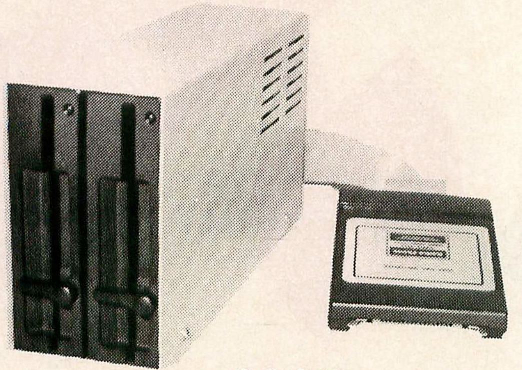

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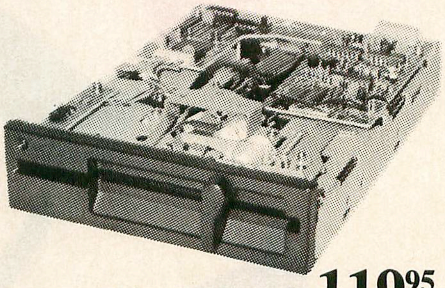

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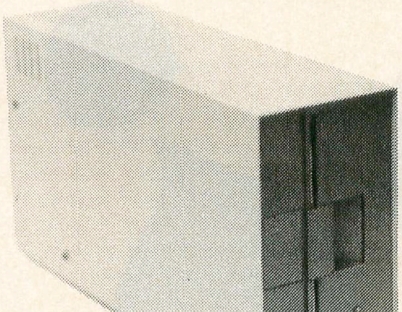

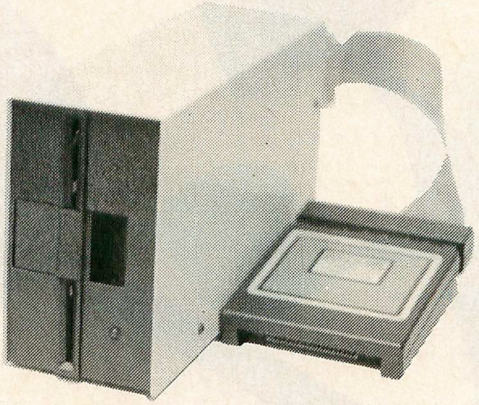

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16K
ECB

Use this program to print out Hebrew characters for Chanukah cards, party invitations or thank you notes

HEBREW WRITER

By Aryeh Glaberson

Have you ever had to write a report in Hebrew, and didn't like making draft after draft because of a few spelling errors? For the many needy programmers out there who just want prepackaged/preprogrammed software without having to read manuals, I decided to make an easy-to-learn program to do the job.

Hebrew Writer is a program that consists of a primitive screen editor for use with Hebrew, and a corresponding downloading character set for the Okidata 92 and 93 printers. The combination is roughly equivalent to a smart electronic typewriter. This program should be useful for preparing invitations to Chanukah parties, thank-you notes to Bubie and Zaide for Chanukah "gelt," and holiday greetings to your friends.

The program has three main parts: The character table for the dot matrix printer (lines 420 to 710), the character set for the `PMODE 4` Hi-Res screen (lines 720 to 1300), and the executing part of the program (lines 1310 to 1810).

One of the main difficulties with writing Hebrew is that it is printed out from right to left instead of left to right as in English. To print the characters on the screen, the program pokes the character data into graphics memory instead of drawing, because `DRAW` is a rather slow process. One way to improve the characters would be to change the first part of the program, which has all the data for the screen characters. The same can be done to the printer characters by changing the second part of the program, which contains the data for the characters downloaded to the printer. A different code would have to be written for a printer other than the Okidata.

The cursor is an underline that is drawn underneath the next character to be drawn. The printer baud rate (set for 2400) can be changed by editing Line 130.

The program starts by setting the baud rate and sending you to the help screen. The uppercase characters are gotten by using the shift keys (the program sets the lowercase flag in Line 1590). The listing doesn't have to be changed to fit into a disk system because it checks for the beginning of graphics memory in Line 1485 by peeking at Hex $BA.

The two arrow keys are used to move the cursor around. Typing `H` at any time calls the help screen which shows the key equivalents. A carriage return then returns to the editor with the cursor not moved. Typing the appropriate keys produces a right-to-left display of the Hebrew characters. Another carriage return clears the screen, sends the line to the printer and produces the proper right-to-left hard copy. Two passes are made by the printer to achieve double-strike and to put in appropriate descenders. The cursor is returned to the upper-right of the screen. When nearing the 18th character, some beeps are sounded to warn of an end-of-line because the program automatically sends the line to the printer on the 18th character. Typing `K` before printing deletes the line, and `Q` quits to BASIC.

When the computer is doing some calculations it uses the speed-up poke, but slows down when it does any printing. If your machine can't handle it, take out Line 390, take out the poke in Line 1500, and delete lines 1760 and 1790. ☐

Aryeh Glaberson lives in Edison, N.J., and is a sophomore at the Rabbi Jacob Joseph Yeshiva where he is presently pursuing Talmudic Studies.

```
280 ......136 1330 .....218
460 .......89 1540 .....108
620 .......35 1700 .....173
750 ......224 END .....107
1080 ......52
```

The listing: HEBWRITE

```
100 REM****     HEBREWRITER
110 REM****   16K  ECB  COCO
120 REM****     OKIDATA 92&93
130 POKE 150,18
150 GOTO 330
160 CLS:PRINT"ALEF    -  a    BET
 -  b"
170 PRINT"GIMMEL -  g  DALED -
d"
180 PRINT"HAY     -  h  VAV    -
v"
190 PRINT"ZAYIN   -  z  CHET   -
k"
200 PRINT"TET     -  t  YUD    -
y"
210 PRINT"CHAF    -  c CHAF S.-
C"
220 PRINT"LAMED  -  l  MEM    -
m"
230 PRINT"MEM S. -  M  NUN    -
n"
240 PRINT"NUN S.  -  N  SAMECH-
s"
250 PRINT"AYIN     -  i  PHAY  -
p"
260 PRINT"PHAY S.-  P  TSADIK-
x"
270 PRINT"TZADIK S.-X  KUF    -
k"
280 PRINT"RESH    -  r  SHIN   -
S"
290 PRINT"TAF     -  T"
300 PRINT"KILL LINE-K, EXIT-Q, H
ELP-H"
310 INPUT"PRESS ENTER TO START";
ZZ$
320 RETURN
330 CLS:PRINT@70,"hebrew typewri
ter"
340 PRINT@102,"BY ARYEH GLABERSO
N"
350 PRINT@130,"COPYRIGHT @1985 A
. GLABERSON"
360 PRINT@198,"PLEASE WAIT A MOM
ENT"
370 PMODE4,1:PCLS:CLEAR1000
380 REM ***SPEEDDOWN
390 POKE65494,0
400 DIM N(30),D$(58,7)
410 GOTO1310
```

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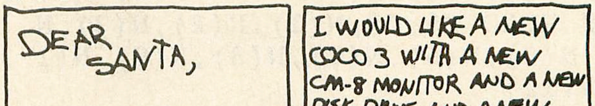
```
420 REM ***PRINTER CHAR TABLE**
430 DATA A,a,0,97,26,100,8,23,32
,67,0,0,0
440 DATA A,b,0,67,0,99,0,99,0,12
7,0,32,0
450 DATA A,g,0,0,96,1,96,31,0,96
,0,0,0
460 DATA A,r,0,1,6,0,6,0,6,0,6,1
20,0
470 DATA A,h,0,0,1,102,16,6,0,6,
0,126,0
480 DATA A,v,0,0,0,1,6,0,126,0,0
,0,0
490 DATA A,z,0,0,0,0,1,118,8,6,0
,0,0
500 DATA A,k,0,0,121,6,0,6,0,6,0
,126,0
510 DATA A,t,0,57,70,0,70,0,72,4
,64,62,0
520 DATA A,y,0,0,1,6,0,6,24,0,0,
0,0
530 DATA A,c,0,0,65,34,65,34,65,
34,65,62,0
540 DATA A,l,0,0,4,10,0,75,0,43,
0,24,0
550 DATA A,m,0,123,4,3,64,32,66,
33,70,56,0
560 DATA A,M,0,125,1,99,1,99,1,9
9,1,127,0
570 DATA A,n,0,0,0,99,0,99,28,0,
0,0,0
580 DATA A,N,0,0,0,0,3,120,7,0,0
,0,0
590 DATA A,s,0,61,66,0,66,0,66,0
,66,60,0
600 DATA A,i,0,97,6,61,0,24,0,12
,0,7,0
610 DATA A,p,0,67,8,70,8,66,0,66
,4,56,0
620 DATA A,P,0,5,2,5,0,1,0,1,0,1
26,0
621 DATA D,G,0,0,0,0,0,0,0,0,0,1
27,0
630 DATA A,q,0,1,124,1,0,17,0,9,
0,6,0
635 DATA D,Z,0,0,0,0,0,127,0,0,0
,0,0
640 DATA A,d,0,0,1,6,0,6,0,6,120
,6,0
650 DATA A,S,0,127,0,104,4,114,9
,100,2,1,0
660 DATA A,T,0,97,0,127,0,1,0,1,
2,124,0
670 DATA A,C,0,3,0,3,0,3,0,127,0
,3,0
675 DATA D,H,0,0,0,0,0,0,0,127,0
,0,0
680 DATA A,x,0,65,2,69,8,64,8,85
,34,65,0
690 DATA A,X,0,3,4,11,0,120,4,3,
0,3,0
700 DATA A,.,0,0,24,0,24,0,0,0,0
,0,0
710 DATA A,",",0,0,24,64,56,0,0,
0,0,0,0
720 REM ***HI-RES CHAR TABLE
730 DATA 0,0,0,0,0,0,0
740 DATA 0,0,0,0,0,0,0
750 DATA 31,2,2,2,2,2,2
760 DATA 0,0,0,0,0,0,0
770 DATA 0,0,0,0,0,0,0
780 DATA 0,0,0,0,0,0,0
790 DATA 0,0,0,0,0,0,0
800 DATA 0,0,0,0,0,0,0
810 DATA 0,0,0,0,0,0,0
820 DATA 0,0,0,0,0,0,0
830 DATA 0,0,0,0,0,0,0
840 DATA 0,0,0,0,0,0,0
850 DATA 16,15,17,17,17,31,31
860 DATA 4,4,4,4,4,4,4
870 DATA 0,0,0,0,0,0,0
880 DATA 30,9,21,1,1,1,1
890 DATA 0,0,0,0,0,0,0
900 DATA 0,0,0,0,0,0,0
910 DATA 17,17,21,21,21,21,31
920 DATA 31,9,9,9,9,9,25
930 DATA 0,0,0,0,0,0,0
940 DATA 0,0,0,0,0,0,0
950 DATA 0,0,0,0,0,0,0
960 DATA 27,17,10,4,4,4,4
970 DATA 0,0,0,0,0,0,0
```

CoCo Cat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```
980 DATA 0,0,0,0,0,0,0
990 DATA 0,0,0,0,0,0,0
1000 DATA 0,0,0,0,0,0,0
1010 DATA 0,0,0,0,0,0,0
1020 DATA 0,0,0,0,0,0,0
1030 DATA 0,0,0,0,12,12,0
1040 DATA 0,0,0,12,12,4,8
1050 DATA 19,11,6,12,10,25,25
1060 DATA 30,2,2,2,2,2,31
1070 DATA 30,31,1,1,1,31,30
1080 DATA 31,31,2,2,2,2,2
1090 DATA 0,0,0,0,0,0,0
1100 DATA 0,0,0,0,0,0,0
1110 DATA 14,2,2,2,2,13,13
1120 DATA 31,31,1,1,9,9,9
1130 DATA 9,9,9,11,6,12,24
1140 DATA 0,0,0,0,0,0,0
1150 DATA 16,30,17,17,17,17,17
1160 DATA 8,16,14,1,2,4,8
1170 DATA 26,29,9,17,17,23,23
1180 DATA 12,12,4,4,4,12,12
1190 DATA 0,0,0,0,0,0,0
1200 DATA 30,9,9,29,1,1,30
1210 DATA 31,1,1,5,5,4,4
1220 DATA 14,17,1,1,1,1,1
1230 DATA 30,17,17,17,17,17,14
1240 DATA 16,25,27,21,17,17,14
1250 DATA 0,0,0,0,0,0,0
1260 DATA 12,4,4,4,4,4,4
1270 DATA 0,0,0,0,0,0,0
1280 DATA 27,27,18,10,4,2,31
1290 DATA 12,12,4,0,0,0,0
1300 DATA 4,2,5,4,4,4,4
1310 FORJ=1TO32
1320 READ T$,C$,N(1),N(2),N(3),N
(4),N(5),N(6),N(7),N(8),N(9),N(1
0),N(11)
1330 PRINT#-2,CHR$(27);CHR$(37);
T$;C$;
1340 REM ***SEND TO PRINTER
1350 FOR I=1TO11:PRINT#-2,CHR$(N
(I));:NEXTI
1360 NEXT J
1370 PRINT#-2,CHR$(27);CHR$(50);
1380 GOSUB 160
1390 CLS:INPUT"GREEN SCREEN ";GL
$
1400 IFGL$="Y"THENAO=192:BO=255:
ELSEIFGL$<>"Y"THENAO=63:BO=0
1410 CLS:PRINT@198," just one mo
ment";
1420 FORJ=1TO58
1430 FORI=1TO7
1440 READM
1450 IFGL$="Y"THENM=255-M
1460 D$(J,I)=CHR$(M)
1470 NEXTI
1480 NEXTJ
1485 XZ=256*PEEK(&HBA)
1486 XY=XZ+256
1490 POKE &H11A,0
1500 POKE65495,0:SCREEN1,0:IFGL$
="Y"THENPCLS(1)ELSEPCLS
1510 B$=STRING$(80,CHR$(32))
1515 C$=STRING$(80,CHR$(32))
1520 FL=0:CT=32:CN=80
1530 A$=INKEY$:IFA$=""THEN1530
1540 POKEXY+CT+FL*288,BO
1550 IF A$="H" THEN SCREEN1,1:GO
SUB 160:SCREEN1,0:GOTO 1530:ELSE
 IF A$="Q" THEN 1780:ELSE IF A$=
CHR$(13) THEN 1760:ELSE IF A$="K
" THEN 1500:ELSE IF A$<>CHR$(9)
THEN 1600
1560 CT=CT+1:CN=CN+1
1570 IFCT>32ANDFL=0THENCT=32:CN=
80:ELSEIFCT>63ANDFL=1THENCT=0:FL
=0:ELSEIFCT>95ANDFL=2THENCT=32:F
L=1
1580 POKE XY+CT+FL*288,AO
1590 GOTO 1530
1600 CT=CT-1:CN=CN-1
1610 IFCT<0THENCT=63:FL=1:ELSEIF
CT<32ANDFL=1THENCT=95:FL=2:ELSEI
FCT<81ANDFL=2THENGOTO1760:ELSEIF
CT<86ANDFL=2THENSOUND200,1
1620 FF=XZ+CT+FL*288
1630 POKE FF+256,AO
1640 IFA$=CHR$(8)THENGOTO1530
1650 J=ASC(A$)-64
1660 IFA$="."THENJ=31ELSEIFA$=",
"THENJ=32
1670 IFJ<1ORJ>58THENJ=1
1680 GG=32
1690 REM***PRINT CHARS ON SCREEN
1700 FORK=1TO7:POKEFF+GG,ASC(D$(
J,K)):GG=GG+32:NEXTK
1710 POKE FF+256,AO
1720 IFCN<1THENCN=1ELSEIFCN>80TH
ENCN=80
1730 MID$(B$,CN,1)=A$
1732 IFA$="N"THENA$="Z"
1733 IF A$="C" THEN A$="H"
1734 IF A$="P" THEN A$="G"
1735 MID$(C$,CN,1)=A$
1740 GOTO1530
1750 REM***SPEEDDOWN,SEND LINE T
O PRINTER
1760 POKE65494,0
1762 PRINT#-2,CHR$(27);CHR$(37);
CHR$(57);CHR$(0);B$
1766 PRINT#-2,CHR$(27);CHR$(54);
C$
1770 GOTO 1500
1780 POKE&H11A,&HFF:CLS
1790 POKE65494,0
1800 PRINT#-2,CHR$(27);CHR$(48);
1810 END
```

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Four voice music is a snap with your word processor

Deck the Halls

By Rick Woods

One of the shortcomings of the Color Computer is its single voice music in the BASIC mode. But one of the programs available for the 32K CoCo is *Musica II* from Speech Systems, a versatile software music synthesizer. Using it, I've written some music that I think most CoCo users will find enjoyable.

My brother, Randy, and I belong to the New Mexico All-State Choir. Using my choir experience and some help from Randy, I've written music for my CoCo that shows what a great machine it really is.

I converted the music into a string of hexadecimal numbers that can be keyed into the computer using a word processor or the BASIC program in Listing 2. My version of the song "Deck the Halls" is an excellent example of what a CoCo can do when properly programmed.

About Machine Language

Musica II lets you write music for the CoCo in machine language. All the music I've written, therefore, is in machine language. For those who are new to computers, machine language (ML) is the lowest level language that a computer can be programmed in. It consists of zeros and ones (binary values) that the computer uses to turn off and on the many thousands of electrical switches inside the computer. These binary digits are called bits and are assembled in groups of eight to form a byte. Each memory address in the CoCo stores one byte of information. Since listing programs in binary format would lead to unusually long listings, a hexadecimal format is most often used. The hexadecimal numbering system is base 16 and is represented by the numbers 0 to 9, and the letters A to F to represent the values 11 to 15. Notice that Listing 1 consists entirely of these characters. This is the machine language program converted to a string of hexadecimal numbers. Each hexadecimal digit in the music listing represents 4 bits or one-half of a byte (a nibble). Therefore, each address you want to load in the computer requires two hexadecimal characters. Hexadecimal numbers in this article will be represented by a leading dollar sign ($). Looking at Listing 1 then, you can see that the first address ($3DA0) will be loaded with $BD; the second address with $A9; the third address with $28 and so forth.

Loading Music With a Word Processor

Any word processor that saves files in ASCII (the standard data format used

---

Rick Woods is a senior at West Mesa High in Albuquerque, N.M., where he is student president of the music department. His hobbies include music and computers, and he enjoys arranging music for the CoCo.

by most home computers) can be used to enter Listing 1. When you enter the music listing, don't use carriage returns or characters other than those appearing in the listing. The first characters you enter will be `BDA928`. Continue entering the entire listing, being very careful not to make any mistakes. The slightest mistake can have drastic results. Save the text file you created with the word processor to disk using the filename `DECKHALL.DAT`.

As Listing 1 appears, it can't be executed in the computer. It must first be loaded into the proper computer addresses. To accomplish this, Listing 2 is used. After you've keyed in the listing and saved it to disk, run the BASIC program and select the Convert Music option. The program clears memory and sets the start, end and execute addresses of the ML program. Then it reads the text file from disk, converts it to byte-size information and stores it in the proper memory addresses. When the entire text file has been loaded into memory, the program waits for the disk to stop then writes the ML program back to disk in binary, the normal ML format, using the filename `DECKHALL.BIN`. It's only necessary to convert the music listing once. Anytime thereafter, run `MUSCLOAD` and select the Play Song option.

Watch for Errors

If the music doesn't sound good to you after you've converted it, go back and compare the text file to Listing 1 and correct any errors. Each hexadecimal character in Listing 1 represents four bits and there are 5,332 characters in the listing. That means you'll be setting the state of 21,328 bits in the computer's memory. A one-bit error can cause some unusual results. The two errors I inserted into the trial run caused loss of all melody in the first case and made the song sound like a chain saw in the second. So, if you're not satisfied with the results when you finish, go back and check the text file for errors.

Non-disk Users

For those without a disk system, I've written the BASIC program in

Listing 1: `DECKHALL`

```
BDA9288E059F9F888E0420108E3DBCA6A0A780108C3EFB23F6
7E3F0060606A6A6A6A6A6A6A6A6A6A6A6A6A6A6A6A6A6A6A6A
6A6A6A6A6A6A6A6A606060606A6060606060604445434B6054
48456048414C4C536060606060606A606060606A6060606060
6060606060606060606060606060606060606060606A606060
606A604152526E666050474D6E604259605249434B60574F4F
4453606A6060606A60606060434F4E566E6042596044454E4E
495360574549444560606A606060606A606843696071797875
6042596044665260534F465457415245606A606060606A6060
607174727071604D4152515545545445604E6E456E6060606A
6060606A60606060414C4255515545525155456E604E4D6078
7771727360606A6060606A6A6A6A6A6A6A6A6A6A6A6A6A6A6A
6A6A6A6A6A6A6A6A6A6A6A6A6A6A6A60606060606060606060
6060606060606060606060606060606060606060606060FF00
FF002002200E8E4000EC844454ED818C43FE2FF5863F1F8BB6
FF0184F7B7FF01B6FF0384F7B7FF03863CB7FF2334011A508E
4400A680B73FCDEC8197C0D7C3EC8197C6D7C9201681FE2610
EC8497C0D7C3EC0297C6D7C9A60497CD3008A6802BE6274C97
CCD6CDD7CEA69F3FC0AB9F3FC3A99F3FC6A99F3FC9B7FF20DC
C1E384DDC1DCC4E302DDC4DCC7E304DDC7DCCAE306DDCA0ACE
260A0ACC27BFD6CDD7CE20C730843084B600008A00810020BA
4F1F8B8E4000EC844858ED818C43FE2FF53581FF00FF00FF00
FF00FF00FF00FF00FF00FF00FF00FF00FF00FF00FF00FF00FF
00FF00FF00FF00FF00FF00FF00FF00FF00FF00FF00FF00C100
FF00FF00FF00FF00424950585E656B707276777978777472 6F
6B66615D58534E4A46433F3C39383735343332323131313030
2F2F2F2F2F2F2F3031323336383A3E41464A4E52575C5F6265
66696A69696664605D59534E48423D38332E2A272525242425
26292D3136393E43494C5154575A5C5D5D5D5D5D5B5A575553
514E4B4A49474544434241403F3F3D3D3B3938373533312F2C
292725252424252526282B2E3235393E44494C5154585B5D5D
5E5D5D5A56524D49443E38332D2825201D1B181818191A1D20
24262B2F34383C4044484A4C4F4F5152525252525252525151
5150504F4F4E4E4C4A494744423E3A37332D28241F1A15120F
0C0B09090A0C1013181E242B333A4A4E53595D62666A6E7173
75767879797877777675747271706F6D6C6B6A696867666664
6464636261605F5D5D5B5A5958575553525150505050505051
50515253535455565657585859595A5A5A5B5A5A5B5C5D5D5E
5E6062656668696C6E6F71737575767677777675747171706C
6A6764615E5D5B575553524F4E4C4A4A4A494747454443413F
3D3A383734322F2C28262322211F1D1B1A1A19191B1B1E1F21
232425272A2C2E30303332343536363738383838383838393 9
393B3C3D3E3F3F41414241414141404141403F3D3D3B393837
363634323130302E2D2C2C2C2A2A292928262625242220201E
1D1C1B1A1919191A1B1E1F2125282C3136394045434447494A
4C50515556595B5D5E6062646667696A6C6E6F707172747474
76767677777878787879787778777777767675747473727270
70706E6D6D6C6B6A696867666564626261605E5E5E5D5D5C5B
```

Listing 3 so that you, too, can key in this music and enjoy it. This program works a little differently. It loads the data from Listing 1 directly into the proper addresses then saves the machine language program to tape.

This method is a little more difficult since you must keep track of the addresses you load. To help you, each time you press ENTER, the program prints the last address loaded and the next address to load. Be sure to enter an even number of characters. An Improper String Length Error will result if you don't. That's because each byte is represented by two hexadecimal characters. If you enter an odd number of characters, the program will load the last character with a zero in the most significant digit into the next address. When the program loads your next line of data, it jumps ahead one more address. At this point, you'll be one address off in the ML program and it won't work. If you get this error, reenter the data properly.

It's not necessary to key in Listing 1 all at once. You can stop and save the partial ML program to tape and quit for awhile. Just be sure to record the last address you loaded and the next address to load. When you're ready to resume entering the music listing, run the BASIC program and enter the next address you want to load. As you key in the music listing, be sure you don't key in more than five or six screen lines before pressing ENTER. Your keyboard buffer only holds about 255 characters. If you key in more than that without pressing ENTER, you'll get an OS Error, causing program execution to stop.

If you want, you can enter the music listing using Dennis Weide's *Codelode* program from the July 1985 RAINBOW. Use 3DA0 for the start address and keep track of the last address listed each time you press ENTER.

I hope you like the music and I want to wish everyone at THE RAINBOW and all its readers a very happy holiday season.

(Questions about this program may be directed to the author at 14201 Marquette N.E., Albuquerque, NM 87123, 505-836-0582. Please enclose an SASE when writing.) □

```
5A59585758565655555453535252515150504F4E4E4E4D4C4C
4B4B4A4A4A4A49494848474746454544444443444343424141
403F3F3E3E3D3D3C3C3C3B3B3A3A3938383838383837363636
353534333332313131312F2F2F2E2D2D2C2B2A2A2928272725
25252424222120201F1E1D1C1B1A1918171615141312121211
10100F0E0D0C0C0C0C0B0B0B0B0B0B0C0C0C0C0D0E0E0F1011
121214151718191B1D1E20222425272A2B2E31333638393C3E
4143484E545A5E64686C7072757678797878777574716F6D6A
6664615D5B585552504D4B4A484645444240403F3E3E3D3D3C
3C3D3C3C3D3C3E3E3E3F3F404041424242424242424141414 0
403F3E3E3D3C3B3A3A3A3A3A3A3A3C3C3D3E3F414243454648
484A4A4A4B4A4A4B4A4A4A4948474745454444434242414141
41414242424243424343434242414140403F3E3D3C3B3A3A3A
3939383839393A3B3C3D3E3F41424345464748494A4A4A4A4A
494A49484747464544444343424241414242424343434445 45
45464647474747484847474646464544434241 3F3D3B3A3836
34312F2B282523201C19171412100E0D0C0C0C0D0E10121519
1D22262B32383D4241424340FE414243404200039E2015B300
000000039E1015B30AD9073D00001013560AD9073D00002012
3F0AD9073D039E2010420AD906D50000FF0000000000000000
200E7B0AD9073D039E2010420AD906D5000020123F0AD9073D
039E200E7B0AD9073D0000FF00000000000000001010420AD9
06D502B610123F0AD906D502B61013560AD906D502B6101042
0AD906D502B620123F0AD9073D02B610123F0AD9073D02B610
10420AD9073D02B6FF0000000000000000200E7B0AD9073D03
9E200DAB0AD9082102B6200E7B0AD9073D039E200E7B0AD907
3D039EFF00000000000000002015B30AD90000039E1015B30A
D9073D00001013560AD9073D000020123F0AD9073D039E2010
420AD906D50000FF0000000000000000200E7B0AD9073D039E
2010420AD906D5000020123F0AD9073D039E200E7B0AD9073D
0000FF00000000000000001010420AD906D502B610123F0AD9
06D502B61013560AD906D502B61010420AD906D502B620123F
0AD9073D02B610123F0AD9073D02B61010420AD9073D02B6FF
0000000000000000200E7B0AD9073D039E200DAB0AD9082102
B6200E7B0AD9073D039E200E7B0AD9073D039EFF0000000000
0000002010420000000002B61010420DAB09AB000010123F0D
AB09AB000020135600000000036A2010420DAB09AB0000FF00
0000000000000020123F00000000039E10123F0E7B091F0000
1013560E7B091F00002015B300000000039E2010420DAB0821
036AFF000000000000000010123F0E7B091F039E10147B0E7B
091F039E2015B30E7B091F039E10185B0E7B091F039E101B57
0E7B091F039E201CF70E7B091F030BFF000000000000000020
1B570DAB0821041020185B0C2D073D04102015B30AD906D502
B62015B30AD906D502B6FF00000000000000002015B3000000
00039E1015B30AD9073D00001013560AD9073D000020123F00
000000039E2010420AD906D50000FF0000000000000000200E
7B0AD9073D039E2010420AD906D5000020123F0AD9073D039E
200E7B0AD9073D0000FF000000000000000008185B0C2D073D
039E0800000C2D073D039E08185B0C2D073D039E0800000C2D
073D039E08185B0C2D073D039E0800000C2D073D039E08185B
0C2D073D039E0800000C2D073D039E2015B30AD9073D039E10
15B30AD9073D039E1013560AD9073D039EFF00000000000000
0020123F0AD9073D039E2010420AD906D502B6400E7B0AD907
3D039E200000000000000000FF000000000000000000398331
20393A3230323339303034823220393A363035313131303186
3320393A39343130303030823420393A3234363434323031
0020202020202020202020202020202020202020202020202020
20202020202020202020202020202020202020202020202020
20202020202020202020202020202000
```

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Introducing The
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The Coco Graphics Designer allows you to mix text and pictures in all your creations. The program features picture, border, and character font editors, so that you can modify or expand the already built in libraries. Plus a special "grabber" utility is included to capture areas of high resolution screens for your picture library.

Requirements: a Coco or Coco II with a minimum of 32K, One Disk Drive (Disk Ext. BASIC 1.0/1.1,ADOS, or JDOS). Printers supported include: Epson RX/FX, GEMINI 10X, SG-10, NX-10, C-Itoh 8510, DMP-100/ 105/ 400/ 430, Seikosha GP-100/250, Legend 808 and Gorilla Bannana. Send a SASE for complete list of compatible printers.

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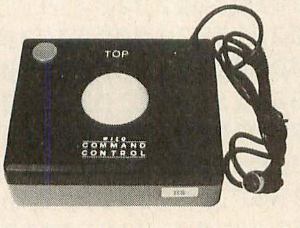

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Listing 2: `MUSCLOAD`

```
1000 '      LISTING 2
1100 '
1200 '
1300 '********************
1400 '**** MUSIC LOAD ****
1500 '********************
1600 '      FOR LOADING
1700 '      MUSIC PROGRAMS
1800 '      USING WORDPROCESSOR
1900 '      WITH DISK SYSTEM
2000 '
2100 '
2200 '      BY RICK WOODS
2300 '      (C) 1985
2400 '
2500 '
2600 '
2700 CLEAR200,&H3DA0
2800 CLS
2900 PRINT:PRINT:PRINTTAB(6)"MUS
IC LOADER PROGRAM"
3000 PRINT:PRINTTAB(10)"BY RICK
WOODS"
3100 PRINT:PRINTTAB(8)"=========
======="
3200 PRINTTAB(10)"PROGRAM MENU"
3300 PRINTTAB(8)"==============
="
3400 PRINTTAB(8)"1. CONVERT MUSI
C"
3500 PRINTTAB(8)"2. PLAY SONG"
3600 PRINTTAB(8)"3. END PROGRAM"
3700 PRINT:PRINTTAB(5)"";:INPUT
"ENTER ONE OF THE ABOVE";Z
3800 IF Z<1 OR Z>3 THEN 2800
3900 ON Z GOTO 4700,4100,4000
4000 END
4100 CLS
4200 IF PEEK(15776)=189 THEN 450
0
4300 LOADM"DECKHALL"
4400 FOR X=1 TO 3000:NEXT X
4500 EXEC &H3DA0
4600 GOTO 2800
4700 OPEN"D",#1,"DECKHALL.DAT",2
4800 FIELD#1,2 AS B$
4900 X=&H3DA0
5000 FOR Y=1 TO LOF(1)
5100 GET#1,Y
5200 A$="&H"+B$
5300 POKE X,VAL(A$)
5400 X=X+1
5500 NEXT Y
5600 CLOSE#1
5700 FOR X=1 TO 5000
5800 NEXT X
5900 VERIFY ON
```

```
6000 SAVEM"DECKHALL",&H3DA0,&H48
09,&H3DA0
6100 GOTO 2800
```

Listing 3: TAPELOAD

```
1000 '      LISTING 3
1100 '
1200 '
1300 '**********************
1400 '***** MUSIC LOAD *****
1500 '**********************
1600 '      FOR LOADING
1700 '      MUSIC PROGRAMS
1800 '      IN NON-DISK SYSTEMS
1900 '
2000 '
2100 '      BY RICK WOODS
2200 '      (C) 1985
2300 '
2400 '
2500 '
2600 CLEAR 200,&H3DA0
2700 CLS
2800 PRINT:PRINT:PRINTTAB(6)"MUS
IC LOADER PROGRAM"
2900 PRINT:PRINTTAB(10)"BY RICK
WOODS"
3000 PRINT:PRINTTAB(8)"=========
=======";
3100 PRINTTAB(10)"PROGRAM MENU"
3200 PRINTTAB(8)"===============
="
3300 PRINTTAB(8)"1. ENTER MUSIC"
3400 PRINTTAB(8)"2. PLAY SONG"
3500 PRINTTAB(8)"3. PRINT DATA"
3600 PRINTTAB(8)"4. END PROGRAM"
3700 PRINT:PRINTTAB(5)"";:INPUT"
ENTER ONE OF THE ABOVE";Z
3800 IF Z<1 OR Z>4 THEN 2700
3900 ON Z GOTO 4100,6100,7300,40
00
4000 END
4100 CLS
4200 X=&H3DA0
4300 INPUT"ENTER START ADDRESS";
SA
4400 IF SA=0 THEN SA=X
4500 PRINT:INPUT"ENTER DATA STRI
NG";D$
4600 IF D$="SAVE" THEN 6800
4700 IF D$="" THEN 4500
4800 IF LEN(D$)/2=INT(LEN(D$)/2)
 THEN 5300
4900 CLS:FOR Q=1 TO 10
5000 PRINTTAB(5)"IMPROPER STRING
 LENGTH":SOUND 100,1
```

The RAINBOW
THE COLOR COMPUTER MONTHLY MAGAZINE

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```
5100 NEXT Q:FOR Q=1 TO 1000:NEXT
 Q
5200 CLS:GOTO 4500
5300 FOR Q=1 TO LEN(D$) STEP 2
5400 E$=MID$(D$,Q,2):E$="&H"+E$
5500 POKE SA,VAL(E$)
5600 PRINT"LOAD ADDR=";HEX$(SA),
5700 SA=SA+1
5800 PRINT"NEXT ADDR=";HEX$(SA)
5900 NEXT Q
6000 GOTO 4500
6100 CLS
6200 PRINT:PRINT:PRINTTAB(7)"NOW
 LOADING MUSIC"
6300 CLOADM"DECKHALL"
6400 FOR Q=1 TO 1000:NEXT Q
6500 EXEC
6600 GOTO 2700
6700 STOP
6800 CLS:PRINT:PRINT
6900 PRINTTAB(5)"PREPARE TAPE RE
CORDER"
7000 PRINT:PRINTTAB(7)"THEN PRES
S <ENTER>"
7100 CSAVEM"DECKHALL",&H3DA0,&H4
809,&H3DA0
7200 GOTO 2700
7300 CLS
7400 PRINT:PRINT:PRINTTAB(10)"NO
W PRINTING"
7500 FOR Q=&H3DA0 TO &H4809
7600 A$=HEX$(PEEK(Q))
7700 A$="0"+A$:A$=RIGHT$(A$,2)
7800 PRINT#-2,A$;
7900 QQ=QQ+1
8000 IF QQ=30 THEN PRINT#-2:QQ=0
8100 NEXT Q
```

Hint . . .

Monochrome Magic on the CoCo 3

Several people have expressed concern that a monochrome monitor is not supported on the Color Computer 3. The CoCo 3 does support a composite color monitor, however. If you want to hook a monochrome monitor to this output, you can obtain acceptable results by issuing the following command line:

```
WIDTH40:PALETTE 8,255:PALETTE 0,0:CLS9
```

All the `CLS9` does is display the Microware name. It is not necessary for this line to work.

Bob Rosen
Howard Beach, NY

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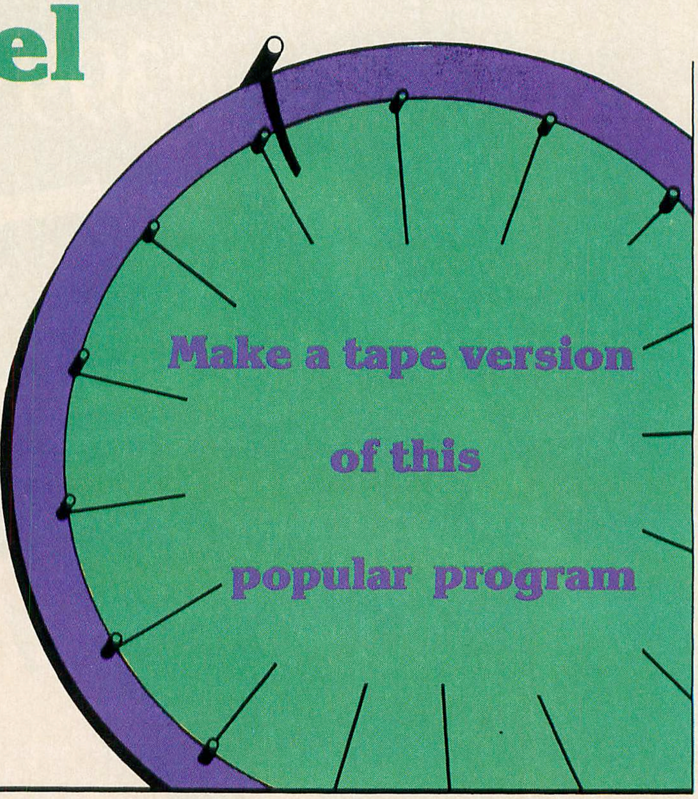
MODIFICATION

64K ECB

Fortune Wheel on Tape



Make a tape version of this popular program

By Arron Branigan

After having *Fortune Wheel* published in the August 1986 issue of RAINBOW, I have received several calls and letters from people wanting to know how to make the program work with a tape system. With my goal clearly laid before me, I set out to accomplish the task. What follows are the results.

To alter Listing 1 (the actual *Wheel* program) for tape operation, you first need to change the following lines as indicated.

```
560 CLS:PRINT@224,"POSITION TAPE
 AT PROPER COUNTER NUMBER, PRESS
 PLAY THEN PRESS    [ENTER]":INPU
TXV:SCREEN1,1:PT=PL
570 POKE65494,0:CLOSE#-1:OPEN "I
",#-1,"CATEGORY":FORZZ=1TO10:INP
UT#-1,CT$(ZZ),K$(ZZ):NEXTZZ:POKE
65495,0
580 FORO=1 TO RD
600 SS=0:DS=RND(10):CAT=VAL(CT$(
DS)):C$=K$(DS):GY=1
610 FORSS=1 TO RO:IFK(SS)=DS THE
N 600 ELSENEXTSS
620 K(RO)=DS:POKE65495,0
630 TL=0:FOR TL=64 TO 1 STEP-1:I
FMID$(C$,TL,1)<>" " THEN640 ELSE
NEXTTL
```

Then delete Line 590 from the original program. Change the `CLEAR 1000` in Line 70 to `CLEAR 1500`. Now, save this altered version to tape.

To alter Listing 2, the *Creator* program, change the following lines as indicated. Note that lines 1000 to 2030 are new and are necessary for tape operation.

```
100 CLS:PRINT@230,"";:INPUT     "
(1)-CREATE FILES
(2)-CORRECT FILES
(3)-LIST FILES
(4)-GET TAPE FILE
(5)-SAVE A TAPE FILE
(6)-END                         M
AKE SELECTION";SE
```

Arron Branigan is a technical sergeant in the U.S. Air Force and is pursuing a bachelor's degree in computer applications at Arkansas State University. He enjoys programming his computer and singing country and western music.

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*TV, platform and disk drive not included. Prices apply at Radio Shack Computer Centers and participating Radio Shack stores and dealers. Sale begins 10/21, ends 12/24.

```
110 IF SE=6 THENPOKE65494,0:END
120 ON SE GOSUB 270,180,510,1000
,2000:GOTO100
190 GOSUB 1000
200 IF FI<1 OR FI>10 THEN 180
210 A1$=A$(FI):B$=B1$(FI)
270 PS=1:POKE65495,0:CLS:IF SE=1
 THENFORFI=1TO10:CLS(6):B$=STRIN
G$(64," "):PRINT@480,"RECORD";FI
;
430 A$(FI)=A1$:B1$(FI)=B$
440 IF SE=1 THENPS=1:NEXT FI
450 RETURN
520 GOSUB1000:POKE65494,0
530 CLS:INPUT"ENTER FILES:START,
END";ST,EN:IF EN>10 THEN EN=10:E
LSE IF ST<1 OR ST>10 OR EN<1 OR
EN>10 OR ST> EN THEN 530
580 PRINT"RECORD";X;CR$;"CATAGOR
Y";CR$;A$(X);CR$;B1$(X)
590 IF CO$="Y" THEN PRINT#-2, US
ING P$ ;X,A$(X),B1$(X)
610 NEXTX:PRINT#-2,CHR$(27);CHR$
(19);:RETURN
1000 POKE 65494,0:CLS:PRINT@224,
"";:INPUT"IF FILE IS NOT IN MEMO
RY THEN   POSITION TAPE TO PROPE
R COUNTER NUMBER THEN PRESS PLAY
, TYPE    LOAD[ENTER] ELSE TYPE
R[ENTER]";Q$:IFQ$<>"LOAD"ANDQ$<>
"R" THEN 1000:ELSE IFQ$="R" THEN
 POKE65495,0:RETURN
1010 OPEN "I",#-1,"CATEGORY"
1020 FOR X5=1TO10:INPUT#-1,A$(X5
),B1$(X5):NEXTX5:POKE65495,0:RET
URN
2000 CLS:PRINT@224,"POSITION TAP
E, PRESS PLAY AND   RECORD THEN
PRESS [ENTER]":INPUT ZZ:POKE6549
4,0:OPEN "O",#-1,"CATEGORY"
2010 MOTORON:FORZZ=1 TO 1800:NEX
TZZ:MOTOROFF:'** CLEAR LEADER ON
 TAPE **
2020 FORX5=1 TO 10:PRINT#-1,A$(X
5),B1$(X5):NEXTX5
2030 CLOSE#-1:RETURN
```

Delete lines 420, 570 and 620 to 680. Now, add `CLEAR 2000` to the beginning of Line 75. Save the result to tape as `CREATOR`. This is all there is to it.

Creator creates a file called `CATEGORY` on your tape. This file will have 10 records. You can put as many files as you want on one tape, however, make sure you start with a blank tape for the first file.

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Fixing CoCo and Multipak Power Supplies

By Marty Goodman

The Color Computer is a very well-made machine. Compared to the competition in its price range, the CoCo has a far superior track record of hardware reliability. Tandy's excellent construction and quality control deserve our appreciation.

Even the best-constructed machines, however, have problems now and then. In the case of the Color Computer, one known problem area is the power supply. I've fixed a number of flaky CoCo power supplies, and heard stories of many others, both from hacker friends and from Tandy repair personnel. In this article I'll tell you some of the problems we've seen and the fixes we've used.

A word of caution: The power supply on all models of CoCo contains *live* 110-volt lines at the transformer board, which are not shut off even when the power switch on the CoCo is turned off. Be *sure* your CoCo is unplugged before working on the power supply.

When measuring voltages on it, be very careful not to brush up against the circuit board on the power transformer. On new machines this board is protected by a piece of cardboard. But on many older machines I've seen, the cardboard has been pulled off by hackers, exposing bare contact points carrying 110 volts AC. Don't forget, hacking on your CoCo or Multipak voids any warranty that may be in effect.

Both the gray CoCo and the older Multipak use pretty much the same power supply for generating 5, +12 and -12 volts. The +12 and -12 volt supplies are simple, linear circuits, using monolithic three-lead regulator chips (7812s and 7912s). The 5-volt supply on the old CoCos and Multipaks is linear, but it's complicated. It uses the older LM-723 regulator IC, along with a Darlington transistor array as a pass/power transistor. The 5-volt power supply is protected by a 6.2-volt over-voltage protection zener diode (1N4735) going from the output of the power supply to ground.

The added complexity of the 5-volt supply has proved to be a source of problems on some machines. On older 'D' boards a .33-ohm power resistor (R66) tended to burn out, causing loss of the 5-volt supply. In cases of other power supply malfunctions, the 6.2-volt zener fuses in the act of protecting the rest of the CoCo's circuitry, shunting all power on the 5-volt line to ground. So check that zener first when you find a dead 5-volt supply.

Sometimes when working on the older CoCo or Multipak power supply, I get exasperated with the overly com-

---

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. Marty is the database manager of RAINBOW'S *CoCo SIG on Delphi. His noncomputer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.*

plicated circuit. I saw a few that were blowing out their 723 regulator chips about as fast as I could replace them. Rather than wasting time tracing the problem further, I prefer ripping out all of the components associated with the 5-volt power supply, including the big TO-3 case heat-sunk power transistor. I then drop a TO-3 case 7805 1.5-amp monolithic regulator into the socket and heat sink formerly occupied by that power transistor.

A few trace cuts and jumpers bring proper input, output and ground lines to the regulator, and hanging a couple of 2.2 mfd anti-oscillation tantalum caps on the input and output of the 7805 completes the fix. The new power supply runs cooler and is far simpler to fix should it develop problems later.

A similar power supply is used on the CoCo 2, but much of the regulator circuitry is now inside the SALT chip (Supply and Level Translator). This is a custom IC, and available only from Tandy national parts. It handles 5-volt power regulation, RS-232 level translation and cassette input. The earliest American CoCo 2s used an early version of the SALT chip that required external protective 3.9-volt zener diodes on the incoming RS-232 lines, but the newer American Coco 2s and all Korean KoKo 2s use a newer version of the SALT chip that has the diodes internally. Because the SALT chip contains all this circuitry, replacing it with standard components would require not only a standard regulator IC, but a lot of other components as well.

Recently I heard about a gray CoCo power supply that began to sizzle and smoke when the computer was turned on. Careful inspection revealed a leaking 220 mfd power filter cap. The juices from that cap were shorting out parts of the 12-volt supply — and the 12-volt supply is required on old CoCos in order for the video to work. So in addition to smoking and sizzling, that machine had lost its video. Replacing the capacitor and cleaning the circuit board cured the problem.

> ***“Recently I heard about a gray CoCo power supply that began to sizzle and smoke when the computer was turned on.”***

One commonly reported problem with CoCo power supplies is cold solder joints, particularly at the junction of the transformer and its associated satellite circuit board. Check that board very carefully in cases of computers with intermittent or flaky 5-volt supplies. If in doubt, just remelt the solder on all conections there. Be especially sure the CoCo's AC plug is out when you do so. If the CoCo is plugged in when you solder on that board, you risk a potentially lethal shock.

That reminds me of my favorite technical repair instructions: “Step 6: To avoid lethal shock hazard, be sure to do Step 5 before Step 4.”

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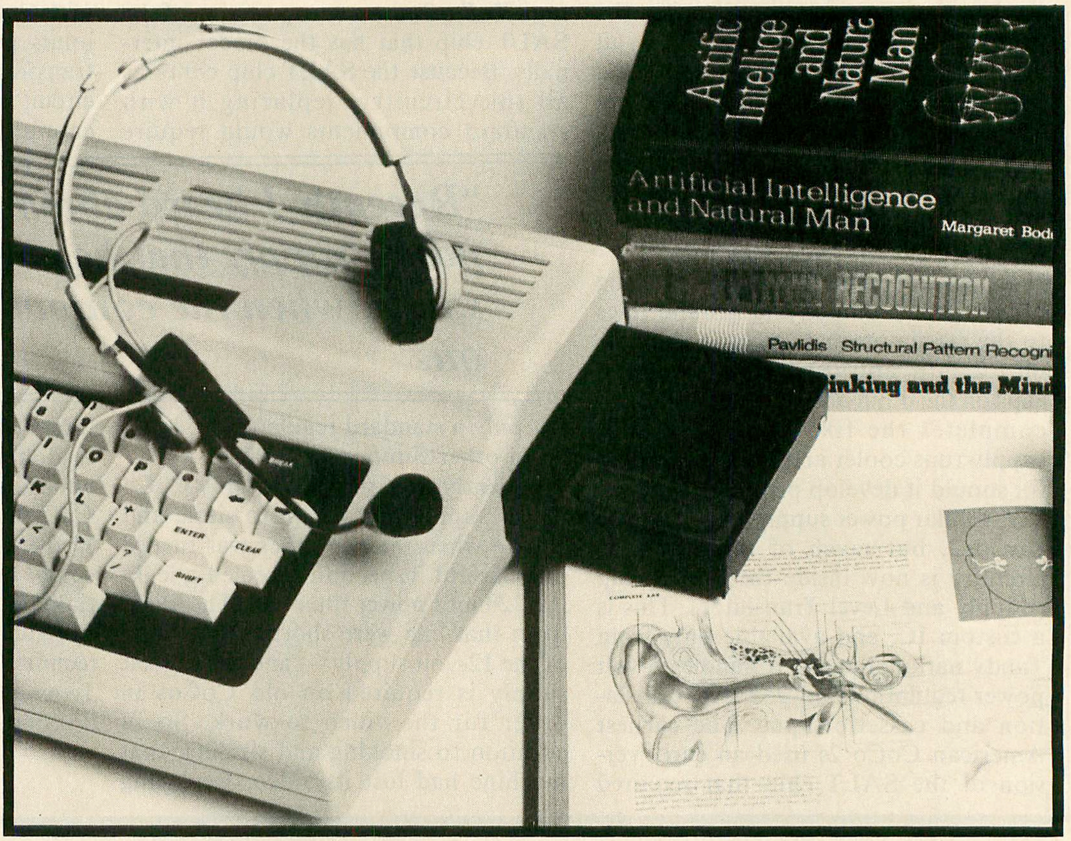
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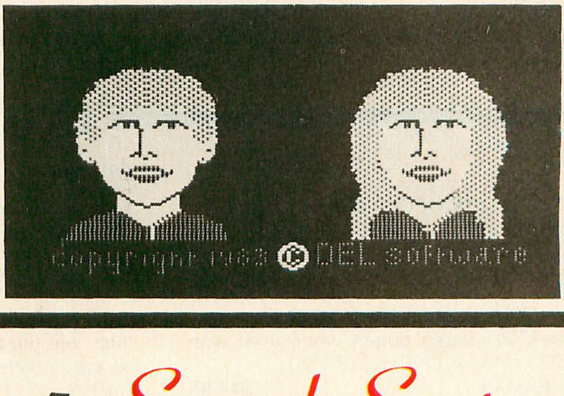

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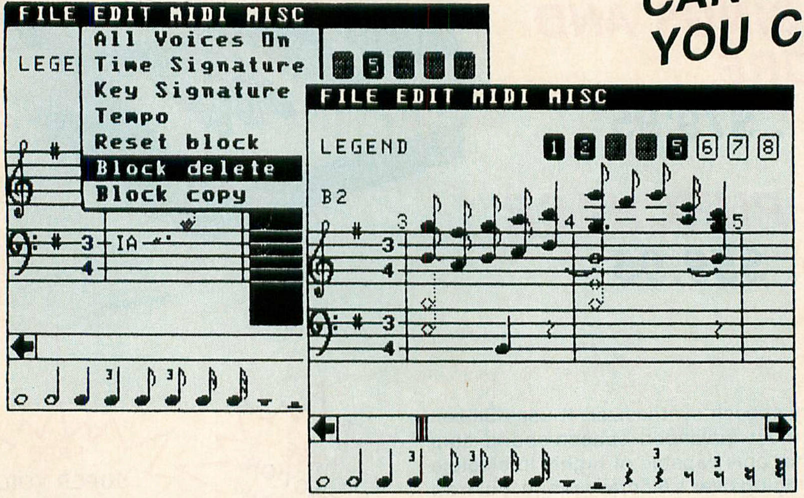

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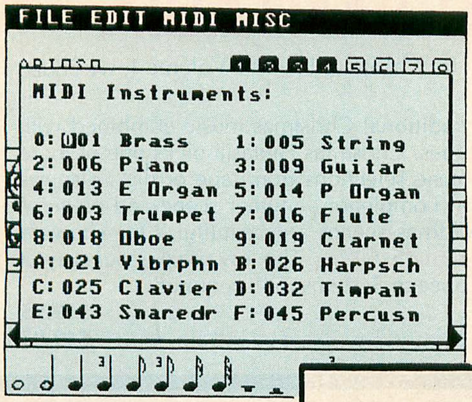

```
MIDI Instruments:

0:001 Brass    1:005 String
2:006 Piano    3:009 Guitar
4:013 E Organ  5:014 P Organ
6:003 Trumpet  7:016 Flute
8:018 Oboe     9:019 Clarnet
A:021 Vibrphn  B:026 Harpsch
C:025 Clavier  D:032 Timpani
E:043 Snaredr  F:045 Percusn
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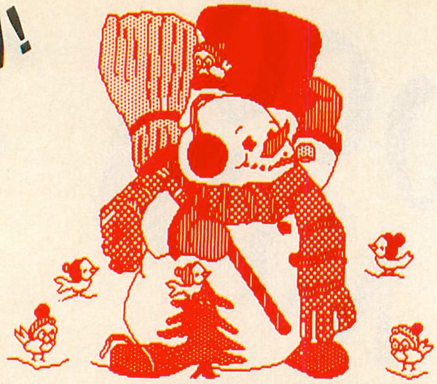

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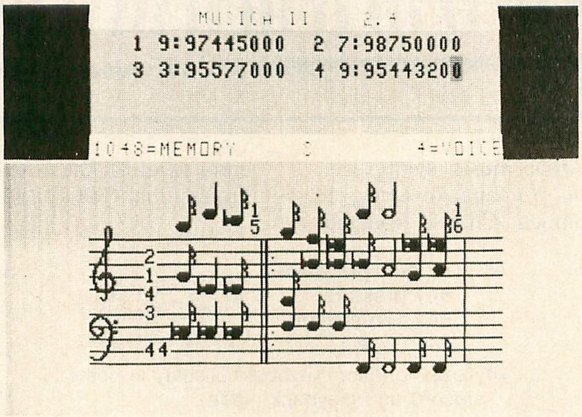
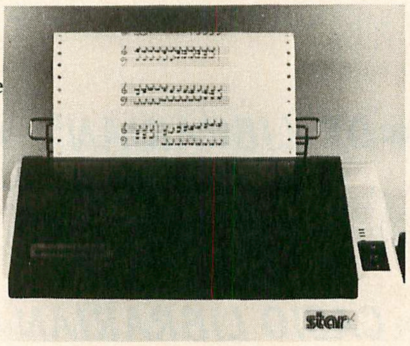


```
        MUSICA II      2.4
1 9:97445000  2 7:98750000
3 3:95577000  4 9:95443200
1048=MEMORY        0         4=VOICE
```

- Output music to your printer (Gemini 10X, Epson, R.S. printers).



- Allows you to specify key signature.
- Voice timbre (waveshape) may be altered by specifying harmonic content just like stops on an organ.
- During editing, voice being inserted is displayed.
- Each measure is numbered for easy reading of music.
- Measure bars aid in reading and developing music.
- Each voice may be visually highlighted for easy identification.
- 4 Voices produced simultaneously.
- Input notes from Coco keyboard, joystick, or Piano Keyboard.
- Play music from your own BASIC program.
- Block copy music for easy music development.
- 100% machine language so it is lightning fast.
- Vibrato effect easily produced.
- With STEREO PAK, voices may be switched between left and right speakers as music plays.
- Durations include: whole, half, quarter, eighth, sixteenth, thirty-second, sixty-fourth, and triplet.

MUSIC LIBRARY™

The MUSIC LIBRARY series consists of 8 volumes: 100 through 800 each sold separately. Each contains over 100 four voice music selections with a playing time of over 3 hours each. The disk version is shipped on 5 full disks. When coupled with STEREO PAK, the music is reproduced with unsurpassed realism.

A JUKEBOX program is included to allow you to select specific songs or automatically play each. These songs are ready to go, you don't need MUSICA 2 or a knowledge of music. MUSICA 2 users may customize each song. Each volume sold separately, specify *tape or disk.* #MLXXX **$29.95**
List of 800 songs #LS800 .... **$3.00**

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Stage, Screen, & TV
Music of the 70's
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Old Time Favorites
Classical
Christmas (popular)
Christmas (traditional)
Patriotic
Polka Party

MUSIC LIBRARY 200 (another 100 selections)
MUSIC LIBRARY 300 (another 100 selections)
MUSIC LIBRARY 400 (another 100 selections)
MUSIC LIBRARY 500 (another 100 selections)
MUSIC LIBRARY 600 (another 100 selections)
MUSIC LIBRARY 700 (another 100 selections)
MUSIC LIBRARY 800 (another 100 selections)

Entire Library
30 Hours of
Music!
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or
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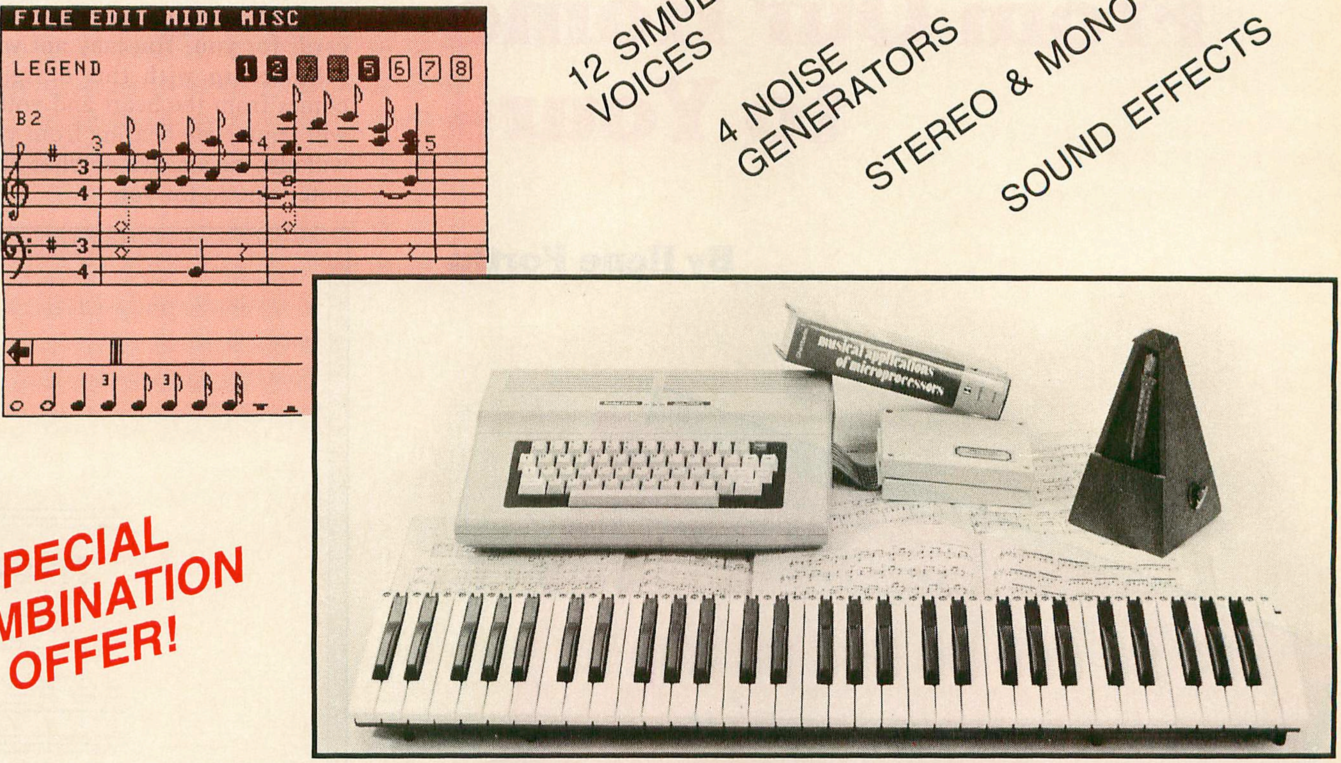
Lyra™ MEETS SYMPHONY 12™

12 SIMULTANEOUS VOICES

4 NOISE GENERATORS

STEREO & MONO

SOUND EFFECTS



SPECIAL COMBINATION OFFER!

If you want to compose music, experiment, or just listen to music, LYRA is the tool you need. LYRA represents the new state-of-the-art super user friendly software. Pull down menus and icons make composing music as easy as pointing with a joystick or mouse and clicking. LYRA is capable of 8 individually controlled voices. You may take advantage of the 8 voice power of LYRA using external MIDI synthesizers or SYMPHONY 12. We believe that LYRA and SYMPHONY 12 was a match made in heaven. For a limited time, when you purchase both, we will include free the LYRA SYMPHONY 12 CONNECTION, a $19.95 value.

STEREO AND MONO. By connecting SYMPHONY 12 to your home stereo system, music is produced in stereo, 6 voices from each channel. However, you don't need to have a stereo system, all 12 voices also come out of your TV or monitor.

SOUND EFFECTS. SYMPHONY 12 is a sophisticated sound generator. 12 voices and 4 noise generators give you incredible sound effect capability. We have included gun shot, explosion, racing car and more.

SYMPHONY 12. You get over a dozen music and sound effect selections and complete documentation. Software is shipped on Tape or Disk.

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GUITAR CHORD BOOK

This program, written by a guitar instructor of 17 years, displays in high resolution graphics the exact fingering for over 100,000 chord combinations. You may even tune your guitar to the computer and play along. Whether you are a beginning guitar student or an advanced player, you will find this quick reference to guitar chords invaluable.

32K Disk only #GC153 . . . . **$29.95**

MUSIC THEORY

COURSE 1

This course covers all the basics from music notation & duration, key signatures, tempo, to an introduction of the keyboard. This is an entry level course recommended as a prerequisite for Course 2.

32K Disk only. #MT101 . . . . **$49.95**

COURSE 2

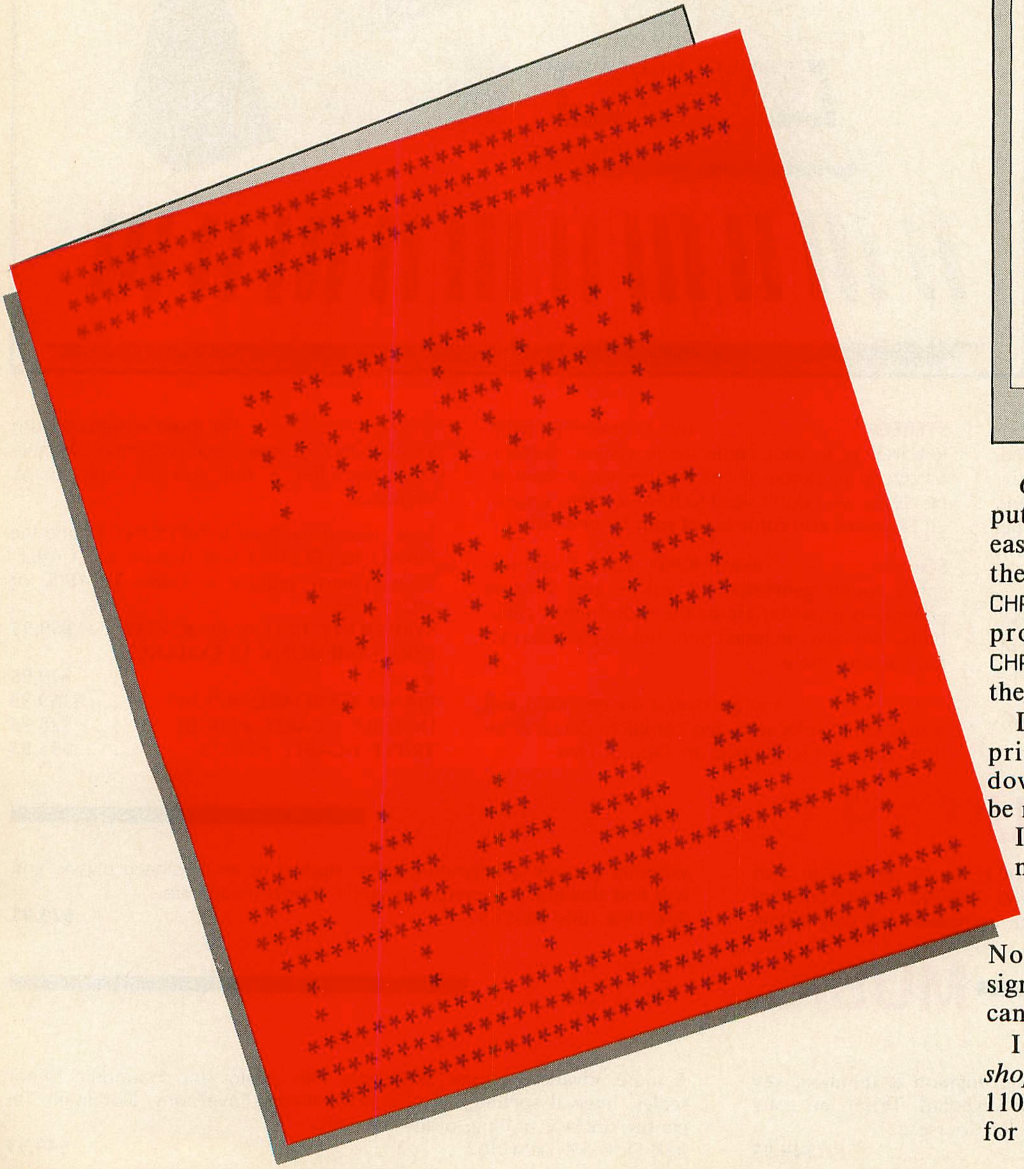
A more advanced course that deals with: Major and Harmonic Minor scales, interval spelling, Triad (Chord) theory, Inversions, Dominant 7th chords, and ear training of the intervals.

32K Disk only #MT102 . . . . **$49.95**

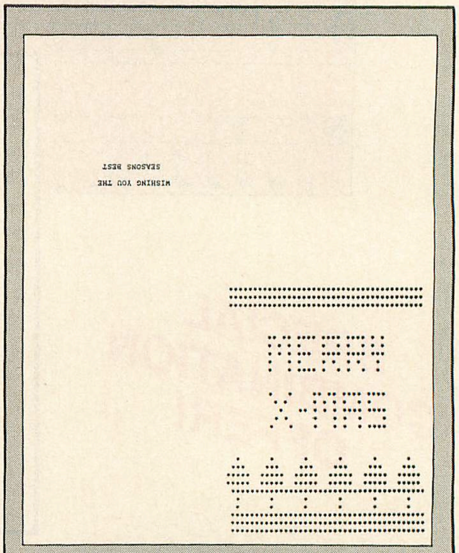
A money-saving greeting card generator for giving holiday cheer

From Our Home to Yours

By Ilene Fortin



Well folks, it appears that the holiday season is nearly upon us once again. It's time to renew old acquaintances with a card or letter, and you can be sure the cost of greeting cards has gone up since last year. This year, however, you needn't turn your hard-earned dollars over to the card company. Let CoCo write your cards for you. You may not win an art scholarship with this design, but it comes from the heart and your friends will appreciate hearing from you. They will also be amazed at what your computer can do for you.



Printout prior to folding.

Cardshop runs on a 16K ECB computer with a Line Printer VIII. It is easily transportable to other printers, as the only character control codes are `CHR$(17)`, which puts the printer in the proportional character set, and `CHR$(19)`, which returns the printer to the regular character set.

Don't be alarmed when you see your printer print the card cover upside down. Once your card is folded, it will be rightside up again (see diagram).

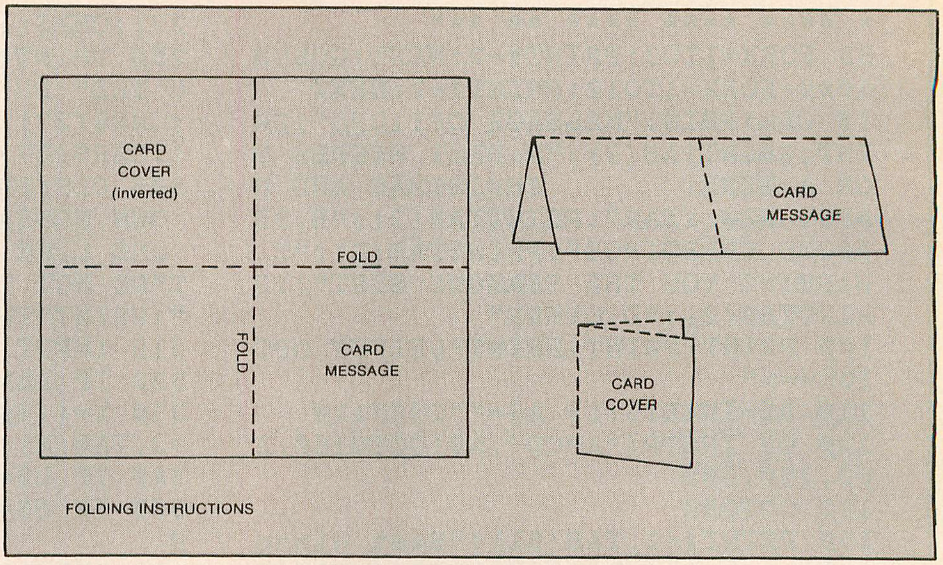
I didn't allow for entering the sender's name because, in my opinion, a card is much more personal when this is done in your own handwriting. Nothing can beat the sincerity of a signature. However, if you so choose, it can easily be added.

I have used four subroutines in *Cardshop*. They begin at lines 1000, 1050, 1100 and 1150. These subroutines are for any lines that are used more than once. This probably wasn't necessary, but subroutines do eliminate a lot of repetition.

The card cover is drawn in lines 30 to 80. Note how `STRING$` is used directly in the statement in Line 30 and as a variable in Line 40. `STRING$` is indispensable when drawing in the text mode, and is explained very well in *Going Ahead With Extended Color BASIC.*

The message menu is in lines 90 to 120. Here you will find a novel use of `INSTR`. It allows one keystroke selection without having to convert the letter pressed to ASCII.

Lines 150 to 250 contain the preprogrammed messages. Lines 300 to 350 allow you to enter your own message. The formula in Line 330 measures the length of your message and centers it properly.



FOLDING INSTRUCTIONS

(You may direct questions about this program to the author at 1410 Limberlost Road, London, Ontario, Canada N6G 2V6. Please enclose an SASE when writing.) ☐

The listing: `CARDSHOP`

```
0 '************************
1 '**      CARDSHOP      **
2 '**         BY         **
3 '**    ILENE FORTIN    **
4 '**     SEPT. 1985     **
5 '**1410 LIMBERLOST RD.**
6 '**    LONDON, ONT.    **
7 '**       N6G 2V6      **
8 '************************
10 CLS:PRINT"MERRY CHRISTMAS":PR
INT:PRINT"I AM READY TO PRINT CA
RDS.":PRINT"IS YOUR PRINTER READ
Y?":PRINT"IF SO, JUST PRESS <P>.
"
20 I$=INKEY$:IF I$<>"P"THEN20
25 CLS:PRINT@202,"PRINTING"
30 GOSUB1000:GOSUB1050:GOSUB1050
:PRINT#-2,STRING$(40,42):GOSUB11
00:GOSUB1100
40 A$=STRING$(3,42):B$=STRING$(4
,32):PRINT#-2,TAB(2);A$;B$;A$;B$
;A$;B$;A$;B$;A$;B$;A$:GOSUB1050:
FORX=1TO3:PRINT#-2:NEXT
50 PRINT#-2,TAB(8);"**** *  * *
  *   *    *":PRINT#-2,TAB(8);"*
    *  * *   *     * *":PRINT#-2
,TAB(8);"**** **** * * * **   *"
:PRINT#-2,TAB(11);"* *  * * * *
    * *":PRINT#-2,TAB(8);"**** *
*** ** **     *    *"
60 PRINT#-2:PRINT#-2
70 PRINT#-2,TAB(9);"*  *  * *  *
 **** *    *":PRINT#-2,TAB(9);"*
  * *  * *     * *   *":PRINT#-2,
TAB(8);"*** **** ****  *** * * *
":PRINT#-2,TAB(8);"* * *  * *  *
    * * * *":PRINT#-2,TAB(8);"*
```

MAILING LIST
DATA INFORMATION PROGRAM

More than just another mailing list program

See Rainbow Reviews August '86, pg. 149

Requires 16K or 64K Tape or 64K Disk System

Price: $29.95

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St. Ann, MO 63074
(314) 441-9278

We welcome:
Checks
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```
************************************
* Want a battery-operated Color 3? *
* You'll need:                     *
*                                  *
* CMOS 63B09E CPU      $49.50      *
* CMOS 63B21  PIA      $19.50      *
*                                  *
* CMOS Conversions                 *
* 480 Oakdale Rd NE                *
* Suite 3                          *
* Atlanta  GA  30307               *
*                                  *
* Send money orders only.          *
************************************
```

```
* **** **** **** ** **"
80 FORX=1TO3:PRINT#-2:NEXT:GOSUB
1000:FORX=1TO12:PRINT#-2:NEXT
90 CLS:PRINT"MESSAGE OPTIONS":PR
INT:PRINTTAB(2);"A.BEST WISHES F
OR A MERRY          CHRISTMAS AND H
APPY NEW YEAR":PRINTTAB(2);"B.SE
ASONS GREETINGS":PRINTTAB(2);"C.
WISHING YOU THE SEASONS BEST";:P
RINTTAB(2);"D.OTHER"
100 PRINT:PRINT:PRINT"SELECT OPT
ION==>"
110 A$=INKEY$:IF A$=""THEN110
120 ON INSTR("ABCD",A$)GOTO150,2
00,250,300
130 GOTO90
150 PRINT#-2,TAB(51);"Best Wishe
s for a":PRINT#-2:PRINT#-2,TAB(5
4);CHR$(27);CHR$(17)"MERRY CHRIS
TMAS";CHR$(27);CHR$(19):PRINT#-2
:PRINT#-2,TAB(58);"and":PRINT#-2
:PRINT#-2,TAB(54);CHR$(27);CHR$(
17)"HAPPY NEW YEAR";CHR$(27);CHR
$(19)
160 GOTO90
200 PRINT#-2,TAB(52);CHR$(27);CH
R$(17);"SEASONS GREETINGS";CHR$(
27);CHR$(19):GOTO90
250 PRINT#-2,TAB(52);"WISHING YO
U THE":PRINT#-2:PRINT#-2,TAB(54)
;CHR$(27);CHR$(17);"SEASONS BEST
";CHR$(27);CHR$(19):GOTO90
300 CLS:PRINT"YOU MAY PRINT YOUR
 OWN MESSAGE.":PRINT:PRINT"ENTER
 ONE LINE AT A TIME.":PRINT:PRIN
T"DO NOT TYPE A LINE LONGER THAN
":PRINT"THIRTY SIX CHARACTERS."
310 INPUT A$
320 IF LEN(A$)>36THEN310
330 X=((40-LEN(A$))/2)+40:PRINT#
-2,TAB(X);A$:GOSUB1150
340 IF B$="Y"THEN300ELSE END
350 IF B$="Y"THENPRINT#-2:GOTO30
0
999 END
1000 A$=STRING$(40,42):FORX=1TO3
:PRINT#-2,A$:NEXT:RETURN
1050 PRINT#-2,TAB(3);"*";:B$=STR
ING$(6,32):C$="*":PRINT#-2,B$;C$
;B$;C$;B$;C$;B$;C$;B$;C$:RETURN
1100 A$="*****  ":PRINT#-2," "A$
;A$;A$;A$;A$;A$:RETURN
1150 INPUT"IS THERE MORE (Y/N)";
B$:RETURN
```

About The One-Liner Contest . . .

THE RAINBOW's One-Liner Contest has now been expanded to include programs of either one or two lines. This means a new dimension and new opportunity for those who have "really neat" programs that simply just won't fit in one line.

Here are the guidelines: The program must work in Extended BASIC, have only one or two line numbers and be entirely self-contained — no loading other programs, no calling ROM routines, no poked-in machine language code. The program has to run when typed in directly (since that's how our readers will use it). Make sure your line, or lines, aren't packed so tightly that the program won't list completely. Finally, any instructions needed should be *very* short.

Send your entry (preferably on cassette) to:

THE RAINBOW One-Liner Contest
P.O. Box 385
Prospect, KY 40059

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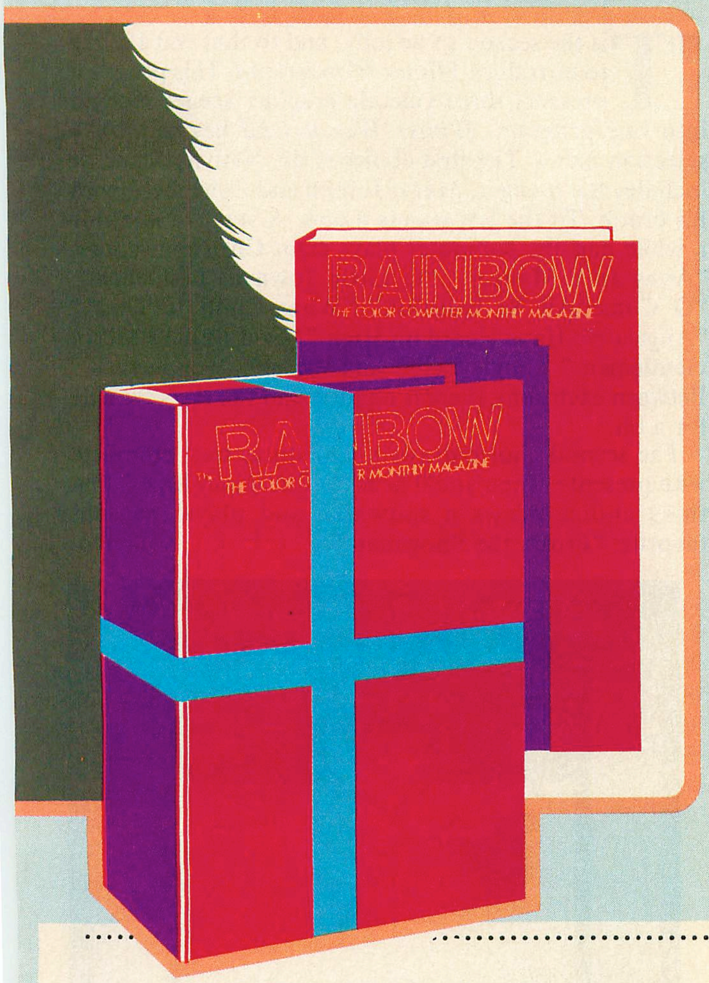
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HOLIDAY SPECIAL

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16K ECB Mod.

RAINBOW ON DISK

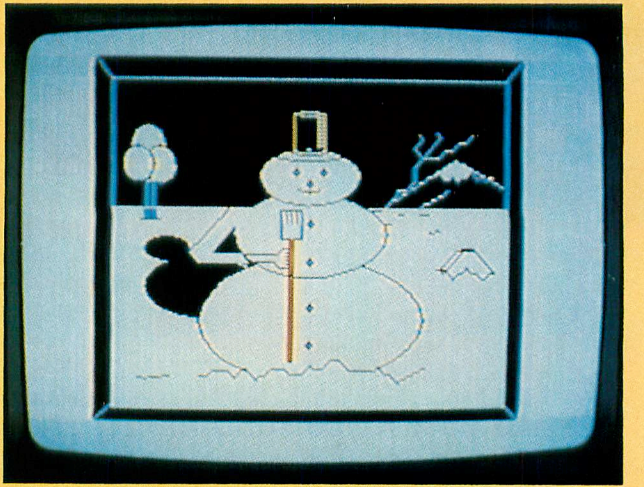
A seasonal song fest to warm your heart

Go Tell It on the CoCo

By Arron Branigan

'Tis the season to be jolly, and to that end I'd like to introduce *Winter Wonderland.* This program presents three yuletide graphics scenes merged into one program. *Winter Wonderland* begins with a selection menu. The first choice is the Nativity scene. It includes the manger, Mary, Joseph and a shepherd with his crook. To the left stands a cow. A star twinkles for a while and the computer plays eight Christmas songs: "Away In a Manger," "O Little Town of Bethlehem," "O Come All Ye Faithful," "What Child Is This?," "Angels We Have Heard on High," "God Rest Ye Merry Gentlemen," "Jingle Bells" and "Winter Wonderland." Between each song there is a pause and the stars twinkle for a bit.

The second choice draws a Christmas tree, complete with presents. Then you'll hear "O Christmas Tree." The third choice draws a snowman and plays that old favorite, "Frosty the Snowman."

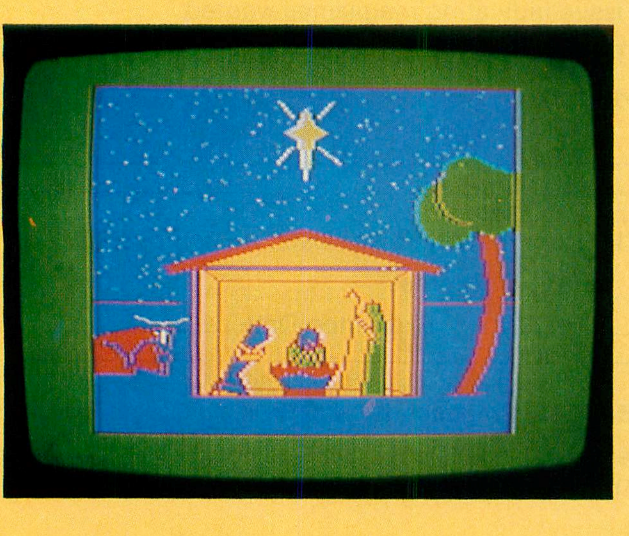


After a picture is completely drawn, the menu can be called up by pressing R, but only when the music is not playing.

The entire listing may be typed in as one long program, or each program module may be typed in separately. The program in its entirety, or, even the Nativity program alone, requires 64K of memory. However, the Christmas tree and snowman programs, if run separately, require only 16K.

If you want to use the program modules separately, delete the lines indicated in the remark lines, and delete lines 10 through 110.

(You may direct questions about this program to the author at 105 Briarfield Cove, Jacksonville, AR 72076, 501-982-6067. Please enclose an SASE when writing.) ☐



Arron Branigan is a technical sergeant in the U.S. Air Force and is pursuing a bachelor's degree in computer applications at Arkansas State University. He enjoys programming his computer and singing country and western music.

140	128	2260	168
390	160	2390	14
650	213	2490	105
830	140	3170	244
1020	147	3360	133
1250	53	3490	165
1500	210	4000	174
1670	29	4280	165
1830	186	4450	211
1980	254	4620	76
2100	27	END	83

The listing: WINTER

```
10 '**************************
20 '* CALLING MENU FOR THREE  *
30 '* CHRISTMAS PROGRAMS      *
40 '* BY: ARRON W. BRANIGAN   *
50 '**************************
60 CLS(RND(8)):PRINT@32,        "
   ***************************
   * CALLING MENU FOR THREE  *
   * CHRISTMAS PROGRAMS      *
   * BY: ARRON W. BRANIGAN   *
   ***************************"
70 PRINT@224,                   "
   ***************************
   * (1)-NATIVITY SCENE      *
   * (2)-CHRISTMAS TREE      *
   * (3)-SNOWMAN             *
   * MAKE SELECTION ?        *
   ***************************
":SEL$=INKEY$
80 PLAY"T255;L255;O5;10;1;O4;10;
1;O3;10;1;O2;10;1;O1;10;1;L2;T2"
90 IF SEL$=""THEN70:ELSESEL=VAL(
SEL$)
100 IF SEL<1OR SL>3 THEN 70
110 IF SEL=1THEN 120:ELSEIFSEL=2
THEN3060:ELSEIFSEL=3THEN4050
120 '****************************
*
130 '* NATIVITY+CHRISTMAS MUSIC
*
140 '* PROGRAM #1
*
150 '* BY: ARRON W. BRANIGAN
*
160 '****************************
*
170 PCLEAR 4
180 PMODE 3,1
190 PCLS
200 SCREEN 1,0
210 PCLS 3
220 LINE (0,0)-(256,193),PSET ,B
230 FOR X=1 TO 300
240 PSET (RND(255),RND(116),1)
250 NEXT X
260 COLOR 2,1
270 LINE (128,12)-(132,20),PSET
280 LINE (132,20)-(140,24),PSET
290 LINE (140,24)-(132,28),PSET
300 LINE (132,28)-(128,48),PSET
310 LINE (128,48)-(124,28),PSET
320 LINE (124,28)-(116,24),PSET
330 LINE (116,24)-(124,20),PSET
340 LINE (124,20)-(128,12),PSET
350 PAINT (128,28),2,2
360 LINE (112,8)-(120,16),PSET
370 LINE (136,16)-(144,8),PSET
380 LINE (120,32)-(112,40),PSET
390 LINE (136,32)-(148,40),PSET
400 COLOR 4,1
410 LINE (44,96)-(129,76),PSET
420 LINE (129,76)-(208,96),PSET
430 LINE (208,96)-(206,100),PSET
440 LINE (206,100)-(128,80),PSET
450 LINE (128,80)-(46,100),PSET
460 LINE (46,100)-(44,96),PSET
470 PAINT (72,92),8,8
480 LINE (60,98)-(196,168),PSET,
B
490 LINE (64,96)-(192,168),PSET,
B
500 PAINT (128,88),2,8
510 PAINT (128,128),2,8
520 LINE (0,116)-(52,116),PSET
530 LINE (196,116)-(255,116),PSE
T
540 CIRCLE (128,108),110,8,1,.95
,.10
550 CIRCLE (138,108),110,8,1,.95
,.10
560 LINE (214,167)-(236,167),PSE
T
570 LINE (224,68)-(237,68),PSET
580 PAINT (224,163),8,8
590 PAINT (240,100),8,8
600 CIRCLE (212,66),20,1,1
610 PAINT (212,66),1,1
620 CIRCLE(224,54),20,1,1
630 PAINT (226,37),1,1
640 CIRCLE (240,60),20,1,1
650 PAINT (252,60),1,1
660 CIRCLE (224,54),20,8,1,.27,.
60
670 LINE (108,152)-(148,152),PSE
T
680 LINE (0,0)-(256,193),PSET,B
690 LINE (148,152)-(140,164),PSE
T
700 LINE (140,164)-(116,164),PSE
T
710 LINE (116,164)-(108,152),PSE
T
```

```
720 PAINT (124,160),3,8
730 FOR X=1 TO 41
740 LINE (X+107,RND(5)+148)-(X+1
07,RND(5)+152),PSET
750 NEXT X
760 LINE (140,152)-(140,140),PSE
T
770 CIRCLE (123,140),4,8,1,.50,.
75
780 CIRCLE (130,136),8,8,1
790 CIRCLE(136,140),4,8,1,.75,1
800 LINE (118,152)-(118,140),PSE
T
810 PAINT (128,144),1,8
820 PAINT (128,132),3,8
830 LINE (118,151)-(130,139),PSE
T
840 LINE (124,151)-(130,143),PSE
T
850 LINE (168,132)-(168,126),PSE
T
860 LINE (134,151)-(130,143),PSE
T
870 LINE (176,168)-(176,128),PSE
T
880 LINE (170,138)-(158,124),PSE
T
890 LINE (162,168)-(166,136),PSE
T
900 LINE (170,134)-(158,121),PSE
T
910 LINE (140,152)-(130,136),PSE
T
920 LINE (168,125)-(164,120),PSE
T
930 CIRCLE (168,120),6,8,1,.5,1
940 LINE (172,120)-(176,128),PSE
T
950 PAINT (172,156),5,8
960 LINE (148,168)-(160,112),PSE
T
970 CIRCLE (156,112),5,8,1,.5,1
980 LINE (70,168)-(74,160),PSET
990 LINE (74,160)-(86,162),PSET
1000 LINE (78,160)-(88,140),PSET
1010 LINE -(96,132),PSET
1020 CIRCLE (100,134),8,4,1,.5,.
05
1030 LINE (106,136)-(98,140),PSE
T
1040 LINE -(97,144),PSET
1050 LINE (95,140)-(93,144),PSET
1060 LINE -(100,144),PSET
1070 LINE -(104,140),PSET
1080 LINE -(104,144),PSET
1090 LINE -(100,148),PSET
1100 LINE -(88,148),PSET
1110 LINE -(93,138),PSET
1120 LINE (96,148)-(88,156),PSET
1130 LINE -(94,168),PSET
1140 LINE -(74,164),PSET
1150 LINE -(72,168),PSET
1160 PAINT (84,156),3,8
1170 PAINT (100,136),3,8
1180 LINE (76,104)-(180,104),PSE
T
1190 LINE -(192,96),PSET
1200 LINE (180,104)-(180,168),PS
ET
1210 LINE (64,96)-(76,104),PSET
1220 LINE -(76,168),PSET
1230 LINE (116,164)-(140,168),PS
ET,BF
1240 LINE (94,164)-(160,164),PSE
T
1250 LINE (192,168)-(180,164),PS
ET
1260 LINE -(176,164),PSET
1270 REM ***COW***
1280 LINE (24,156)-(0,156),PSET
1290 LINE -(0,140),PSET
1300 CIRCLE (8,141),8,8,1,.50,.7
5
1310 LINE (8,134)-(28,130),PSET
1320 LINE -(36,132),PSET
1330 LINE (40,144)-(36,130),PSET
1340 LINE -(48,130),PSET:LINE -(
44,144),PSET:LINE -(40,144),PSET
1350 LINE (46,141)-(44,156),PSET
1360 LINE -(28,152),PSET
1370 LINE -(16,152),PSET
1380 LINE (24,156)-(24,152),PSET
1390 LINE (36,140)-(40,153),PSET
1400 LINE -(28,152),PSET
1410 CIRCLE (42,116),25,2,.5,.15
,.38
1420 PSET (39,133,2):PSET (45,13
3,2)
1430 PAINT (20,144),8,8
1440 CIRCLE (8,152),15,3,1,.75,1
1450 CIRCLE (36,150),15,3,1,.50,
.25
1460 COLOR 2,1
1470 LINE (42,132)-(42,138),PSET
1480 REM ***TWINKLING STAR***
1490 COLOR 2,3
1500 LINE (112,8)-(120,16),PRESE
T
1510 LINE (136,16)-(144,8),PRESE
T
1520 READ A,B
1530 IF A=999 THEN RESTORE :READ
 A,B
1540 LINE (120,32)-(112,40),PRES
```

```
ET
1550 PRESET (A,B)
1560 LINE (136,32)-(148,40),PRES
ET
1570 PSET (A,B,2)
1580 LINE (112,8)-(120,16),PSET
1590 LINE (136,16)-(144,8),PSET
1600 LINE (120,32)-(112,40),PSET
1610 LINE (136,32)-(148,40),PSET
1620 G=G+1:IF G=100 THEN P=P+1:O
N P GOSUB 1700,1770,1850,1940,20
40,2130,2220,2330:IF P=8 THEN P=
0
1630 IF G=125 THEN G=0
1640 A$=INKEY$:'***DELETE THIS L
INE IF ENTERING ONLY 1 PROGRAM**
*
1650 IF A$="R" THEN RUN:'***DELE
TE THIS LINE IF ENTERING ONLY 1
PROGRAM***
1660 GOTO 1490
1670 DATA 10,50,200,40,46,76,96,
24,244,30,10,10,180,50,20,40,220
,40,254,20
1680 DATA 160,20,148,40,100,20,1
00,60,32,40
1690 DATA 999,999
1700 REM **AWAY IN THE MANGER**
1710 FOR X=1 TO 2
1720 PLAY "V27;L4;O4;C;L4.;C;L8;
O3;B-;L4;A;L4.;A;L8;G;L4;F;P30;F
;E;D;L2;C;L4;P30;C;L4.;P30;C;L8;
D;L4;C;P30;C;G;E;D;C;F;L2;A;L4;O
4;C;P30;L4.;C;L8;O3;B-;L4;A;L4.;
A;L8;G;L4;F;P30;F;E;D"
1730 PLAY "L2;C;L4;P30;C;L4.;B-;
L8;A;L4;G;A;G;F;G;D;E;L2;F"
1740 NEXT X
1750 PLAY "L1;F"
1760 RETURN
1770 REM ***O LITTLE TOWN OF***
         ***BETHLEHEM        ***
1780 FOR X=1 TO 2
1790 PLAY "V27;O2;L4;A;P60;A;P60
;A;G+;A;O3;C;O2;B-;D;G;F;L8;E;F;
L4;G;C"
1800 PLAY "L2.;A;L4;A;P60;A;P60;
A;O3;D;C;P60;C;O2;B-;D;G;F;L8;E;
F;L4;A;G"
1810 PLAY "L2.;F;L4;A;P60;A;P60;
A;G;F;L2;E;L4;P60;E;P60;E;D;E;F;
G"
```

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```
1820 PLAY "L2.;A;L4;P60;A;P60;A;
P60;A;G+;A;O3;C;O2;B-;D;O3;D;C;O
2;F;L4.;A;L8;G;L2.;F"
1830 NEXT X
1840 RETURN
1850 REM **O COME ALL YE FAITHFU
L**
1860 FOR X=1 TO 2
1870 PLAY "V27;O2;L4;F;L2;P60;F;
L4;C;F;L2;G;C;L4;A;G;A;B-"
1880 PLAY"L2;A;L4;G;F;L2;P60;F;L
4;E;D;E;F;G;A;L2;E;L4.;D;L8;C"
1890 PLAY "L1;P60;C;L2;O3;C;L4;O
2;B-;A;L2;B-;A;L4;G;A;F;G"
1900 PLAY "L4.;E;L8;D;L4;C;F;P60
;F;E;F;G;L2;F;L4;C;A;P60;A;G;A;B
-"
1910 PLAY "L2;A;L4;G;A;B-;A;G;F;
L2;E;L4;F;B-;L2;A;L4.;G;L8;F;L2.
;P60;F"
1920 NEXT X
1930 RETURN
1940 REM **WHAT CHILD IS THIS**
1950 FOR X=1 TO 2
1960 PLAY "V27;O2;L4;G;L2;B-;L4;
O3;C;L4.;D;L8;E;L4;D;L2;C;L4;O2;
A;L4.F;L8;G;L4;A"
1970 PLAY "L2;B-;L4;G;L4.;P60;G;
L8;F+;L4;G;L2;A;L4;F+;L2;D;L4;G;
L2;B-;L4;O3;C;L4.;D;L8;E;L4;D"
1980 PLAY "L2;C;L4;O2;A;L4.;F;L8
;G;L4;A;L4.;B-;L8;A;L4;G;L4.;F+;
L8;E;L4;F+;L2.;G;P60;G"
1990 PLAY "O3;F;L4.;P60;F;L8;E;L
4;D;L2;C;L4;O2;A;L4.;F;L8;G;L4;A
;L2;B-;L4;G"
2000 PLAY "L4.;G;L8;F+;L4;G;L2;A
;L4;F+;L2.;D;O3;F;L4.;P60;F;L8;E
;L4;D"
2010 PLAY "L2;C;L4;O2;A;L4.;F;L8
;G;L4;A;L2;B-;L4;G;L4.;F#;L8;E;L
4;F+;L2.;G;P60;G"
2020 NEXT X
2030 RETURN
2040 '**ANGELS WE HAVE HEARD **
     *********ON HIGH**********
2050 FOR X=1 TO 2
2060 PLAY "V27;O2;L4;B;P60;B;P60
;B;O+;D;L4.;P60;D;L8;C;L2;O-;B;L
4;P60;B;A;B;O+;D;L4.;O-;B;L8;A;L
2;G"
2070 PLAY "L4;B;P60;B;P60;B;O+;D
;L4.;P60;D;L8;C;L2;O-;B;L4;B;A;B
;O+;D;L4.;O-;B;L8;A;L2;G"
2080 PLAY "O+;D;L8;E;D;C;O-;B;O+
;L2;C;L8;D;C;O-;B;A;L2;B;O+;L8;C
;O-;B;A;G;L4.;A;L8;D;L2;P60;D"
2090 PLAY "L4;G;A;B;O+;C;O-;L2;B
;L4;A;P4;O+;L2;D;L8;E;D;C;O-;B;L
2;O+;C;L8;D;C;O-;B;A"
2100 PLAY "L2;B;L8;O+;C;O-;B;A;G
;L4.;A;L8;D;L2;P60;D;L4;G;A;B;O+
;C;;L2;O-;B;A;L1;G"
2110 NEXT X
2120 RETURN
2130 '**GOD REST YE MERRY ***'
     '**  GENTLEMEN       ***'
2140 FOR X=1 TO 2
2150 PLAY "O2;L4;D;P60;D;A;P60;A
;G;F;E;D;C;D;E;F;G"
2160 PLAY "L2.;A;L4;D;P60;D;A;P6
0;A;G;F;E;;D;C;D;E;F;G"
2170 PLAY "L2.;A;L4;P60;A;B-;G;A
;B-;O+C;D;O-;A;G;F;D;E;F"
2180 PLAY"L2;G;L4;F;G;L2;A;L4;B-
;A;P60;A;G;F;E;L2;D;L8;F;E;L4;D"
2190 PLAY "L2;G;L4;F;G;A;B-;O+C;
D;O-;A;G;F;E;L2.;D"
2200 NEXT X
2210 RETURN
2220 '****JINGLE BELLS****'
2230 FOR X=1 TO 2
2240 PLAY "T5;O4;L4;C;P60;C;A;G;
F;L2.;C;L8;P60;C;P120;C;L4;P60;C
;A;G;F"
2250 PLAY "L2.;D;P60;L4;D;P60;D;
B-;A;G;L2.;E;L4;O+;C;D;C;O-;B-;G
;L2.;A;L4;C"
2260 PLAY "P60;C;A;G;F;L2.;C;L8;
C;P120;C;P60;L4;C;A;G;F;L2.D;L4;
P60;D;P60;D;B-;A;G;O+;C;P60;C;P6
0;C;P60;C;D;C;O-;B-;G;L1;F"
2270 FOR Y=1 TO 2
2280 PLAY "L4;A;P60;A;P60;L2;A;L
4;P60;A;P60;A;P60;L2;A;L4;P60;A;
O+;C;O-;F;G;L1;A;L4;B-;P60;B-;P6
0;B-;P60;B-;P60;B-;A;P60;A;L8;P6
0;A;P120;A"
2290 IF Y=1 THEN PLAY "L4;A;G;P6
0;G;A;L2;G;O+;C;O-" ELSE PLAY "L
4;O+;C;P60;C;O-;B-;G;L1;F;T2"
2300 NEXT Y
2310 NEXT X
2320 RETURN
2330 '***WINTER WONDERLAND***
2340 PLAY "T3;O3;L8;F;P60;F;P60;
F;G;P60;G;P60;L4;G;L8;P60;G;L8;A
;P60;A;P60;A;B-;L4.;P60;B-;L8;P6
0;B-"
2350 PLAY "O+;C;P60;C;P60;C;D;P6
0;D;L4;P60;D;P60;L8;D;C;P60;C;P6
0;C;O-;B-;L2;P60;B-"
2360 PLAY "L8;A;P60;A;P60;A;O+;D
;P60;D;L4;P60;D;P60;L8;O-;F;P60;
```

```
F;P60;F;A;P60;A;L4;P60;A;L8;P60;
A"
2370 PLAY "L4;G;L2.;F;P1;L8;F;P6
0;F;P60;F;G;P60;G;P60;L4.;G"
2380 PLAY "L8;A;P60;A;P60;A;B-;P
60;L2;B-;L8;O+;C;P60;C;P60;C;D;P
60;D;L4.;P60;D"
2390 PLAY "L8;C;P60;C;P60;C;O-;B
-;P60;L2;B-;L8;A;P60;A;P60;A;O4;
D;P60;D;L4;P60;D;L8;P60;D"
2400 PLAY "O-;F;P60;F;P60;F;A;P6
0;A;P60;L4;A;L8;P60;A;L4;G;L2.;F
;L4;P3"
2410 FORX=1 TO 2
2420 PLAY "O+;L8.;C;P60;L16;C;L2
.;P60;C;L8.P60;C;L16;P60;C;O-;L4
;A;O+;L2;C;L8.;P60;C;L16;P60;C"
2430 PLAY "L2.;C;L8.;P60;C;L16;P
60;CL4;O-;B-;O+;L2;C;P16;L8;C;E;
P60;E;P60;E;D;L4.;D;L8;P60;D"
2440 PLAY "C;P60;C;P60;C;O-;B-;L
2;B-;L8.A;P60;L16;A;P60;L8.;A;L1
6;P60;A;L8.;G;P60;L16;G;L8.;P60;
G;L16;P60;G;L2.;F"
2450 IF E=1 THEN RETURN
2460 NEXT X
2470 PLAY "P4;L8.;E;L16;P60;E;L8
.;O+;C+;L16;P60;C+;O-;L8.;F+;L16
;F+;L8.;O+;D;L16;P60;D;L4;C+;L2.
;O-;A"
2480 PLAY "L8.;E;L16;P60;E;L8.;O
+;C+;L16;P60;C+;O-;L8.;F+;L16;P6
0;F#;L8.;P60;O+;D;L16;P60;D;L2;C
+;L8;C+;P8"
2490 PLAY "O-;L8.;G;L16;P60;G;L8
.;O+;E;L16;P60;E;O-;L8.;A;P60;L1
6;A;O+;L8.;F;P60;L16;F;L4;P60;E;
;L2;C;L4;P60;C"
2500 PLAY "L8.;E;P60;L16;E;O-;L8
.;A;P60;L16;A;O+;L8.;D;P60;L16;D
;O-;L8.;G;P60;L16;G;L2;O+;C;L4;C
;O-"
2510 E=1:GOSUB 2420:E=0
2520 PLAY "T2"
2530 RETURN:'***END PROGRAM #1**
3000 '**************************
3010 '*  CHRISTMAS TREE  &      *
3020 '*  CHRISTMAS TREE MUSIC *
3030 '*  PROGRAM #2             *
3040 '*  BY: ARRON W.BRANIGAN *
3050 '**************************
3060 PCLEAR 4
3070 PMODE 3,1
3075 RESTORE:FORX=1TO32:READA:NE
XTX:'**DELETE THIS LINE IF LOADI
NG ONLY 1 PROGRAM**
3080 PCLS
3090 SCREEN 1,0
3100 FOR X=1 TO 150
3110 C=RND(8):IF C=1 OR C=5 OR C
=4 OR C=8 THEN 3110
3120 CIRCLE (RND(144)+60,RND(148
)+14),4,C
3130 NEXT X
3140 DRAW "BM128,12;G10;R4;G15;R
8;G20;R12;G25;R16;G30;R20;G35"
3150 DRAW "R150"
3160 DRAW "H35;R20;H30;R16;H25;R
12;H20;R8;H15;R4;H10"
3170 DRAW "BM126,147;D30;G10;R22
;H10;U30"
3180 PAINT (1,1),2,8
3190 LINE (0,0)-(256,192),PSET,B
3200 LINE (128,0)-(128,12),PSET:
LINE (124,4)-(132,4),PSET
3210 COLOR 3,1
3220 LINE (84,172)-(104,186),PSE
T,BF
3230 COLOR 4,1
3240 LINE (154,172)-(174,186),PS
ET,BF
3250 COLOR 2,1
3260 LINE (94,172)-(94,186),PSET
3270 LINE (164,172)-(164,186),PS
ET
3280 LINE (84,179)-(104,179),PSE
T
3290 LINE (154,179)-(174,179),PS
ET
3300 READ A,B,C
3310 IF A=999 THEN 3350
3320 CIRCLE (A,B),4,4
3330 CIRCLE (128,12),10,4,1,.10,
.23
3340 GOTO 3300
3350 FOR X=10 TO 150 STEP 10
3360 CIRCLE (128,12),X,2,1,.10,.
43
3370 NEXT X
3380 COLOR 8,1
3390 LINE (0,0)-(256,192),PSET,B
3400 DATA 128,62,2,92,108,8,138,
58,3,132,108,3,88,140,3,130,140,
2,120,135,3,110,125,4
3410 DATA 119,88,2,118,108,2,128
,108,4,108,98,2,128,98,4,138,90,
3,170,140,2,160,130,3
3420 DATA 160,140,5,128,32,2,128
,63,3,128,39,5,124,39,2,152,76,3
,152,86,3
3430 DATA 999,999,999
3440 PLAY "V27;L4;O3;D;L8.;G;L16
;P60;G;L4;P60;G;A;L8.;B;L16;P60;
B;L4;P60;B;P60;B;L8;A;B;O+;L4;C;
```

```
O-;F+"
3450 PLAY "A;G;D;L8.;G;L16;P60;G
;L4;P60;G;A;L8.;B;L16;P60;B;L4;P
60;B;P60;B"
3460 PLAY "L8;A;B;L4;O+;C;O-;F+;
A;G;O+;D;L8;P60;D;O-;B;O+;L4.;E;
L8;D"
3470 PLAY "P60;D;C;P60;L4.;C;L8;
P60;C;P60;C;O-;A;O+;L4.;D;L8;C;P
60;C;O-;B;P60;L4;B;D"
3480 PLAY "L8.;G;L16;P60;G;L4;P6
0;G;A;L8.;B;L16;P60;B;L4;P60;B;P
60;B;L8;A;B;O+;L4;C;O-;F+;A;G"
3490 FOR T=1 TO 10
3500 A=0 :B=1:C=1
3510 FOR X=1 TO 140 STEP 10
3520 FOR Y=A TO C STEP 8
3530 A$=INKEY$:IF A$="R" THEN RU
N:'***DELETE THIS LINE IF ENTERI
NG ONLY 1 PROGRAM***
3540 PSET (128+Y,12+X,3):PSET(12
8+Y+1,12+X,3)
3550 PSET (128+Y,12+X+1,3):PSET(
128+Y+1,12+X+1,3)
3560 PSET (128+Y+2,12+X,3):PSET
(128+Y,12+X+2,3)
3570 PSET (128+Y+1,12+X+2,3)
3580 PSET (128+Y,12+X,2):PSET (1
28+Y+1,12+X,2)
3590 PSET (128+Y,12+X+1,2):PSET
(128+Y+1,12+X+1,2)
3600 PSET (128+Y+2,12+X,2):PSET(
128+Y,12+X+2,2)
3610 PSET (128+Y+2,12+X+2,2)
3620 PSET (128+Y+2,12+X+1,2)
3630 NEXT Y
3640 A=A-4:C=C+4
3650 NEXT X
3660 NEXT T
3670 GOTO 3440
3680 GOTO 3680:'**END PROGRAM#2*
*
4000 '***************************
4010 '*     THE SNOWMAN         *
4020 '*     PROGRAM #3          *
4030 '*  BY: ARRON W.BRANIGAN *
4040 '***************************
4050 PCLEAR 4:CLEAR 255
4060 X=10
4070 PMODE 4,1
4080 PCLS
4090 SCREEN 1,1
4100 LINE (10,10)-(251-5,188-5),
PSET,B
4110 FOR Y=1 TO 3
4120 X=X*1.5
4130 CIRCLE (128,X*4),X*2,,.5
4140 PAINT (128,X*4),1,1
4150 NEXT Y
4160 X=10
4170 FOR Y=1 TO 3
4180 X=X*1.5
4190 CIRCLE (128,X*4),X*2,0,.5,1
,.5
4200 NEXT Y
4210 CIRCLE (128,63),2,0
4220 CIRCLE (120,57),2,0
4230 CIRCLE (136,57),2,0
4240 CIRCLE (128,63),10,0,.5,.15
,.40
4250 CIRCLE (128,84),2,0
4260 CIRCLE (128,104),2,0
4270 CIRCLE (128,128),2,0
4280 CIRCLE (128,148),2,0
4290 CIRCLE (128,47),10,0,.2
4300 DRAW "BM119,47;C1;U20;B;R18
;D20"
4310 CIRCLE (128,27),8,1,.2
4320 FOR T=1 TO 8
4330 CIRCLE (128,27+T*2),8,1,.2,
1,.15
4340 NEXT T
4350 CIRCLE (128,47),25,0,.2,1,.
5
4360 DRAW "BM88,80;C1;G20;R21;C0
;R20;E3;R4;D2;L2;R2;D2;L2;R2;D2;
L2;R2;D2;L2;R2;D2;D50;R2;U65;R5;
U15;L3;D7;U7;L3;D7;U7;L3;D7;U7;L
3;D15;R5;D15;L2;L4;H3;L16;C1;H4;
F4;L30;H5;E21;R12"
4370 PAINT (86,80),1,1
4380 DRAW "BM165,78;R5;E10;U2;R5
;E5;U7;E5;H5;E5;H2;F2;G5;F5;E10;
G2;E3;H2;F2;G3;E2;G10;R10;E4;R4;
E4;R4;E4"
4390 DRAW "BM10,76;C1;R235"
4400 DRAW "BM30,82;U20;R4;D20;R3
;L10"
4410 CIRCLE (25,53),10
4420 PAINT (25,53),1,1
4430 CIRCLE (38,53),10
4440 PAINT (38,53),1,1
4450 CIRCLE (31,43),10
4460 PAINT (31,43),1,1
4470 CIRCLE (25,53),10,0
4480 CIRCLE (38,53),10,0,1,.65,1
4490 CIRCLE (42,97),15,1,.5,.25,
.01
4500 CIRCLE (63,117),35,1,.5,.80
,.65
4510 PAINT (15,160),1,1
4520 CIRCLE (128,135),67.5,0,.5,
.83,.15
4530 CIRCLE (128,135),67.5,0,.5,
.35,.6
4540 CIRCLE (128,90),45,0,.5,.83
,.50
4550 LINE (52,102)-(80,76),PRESE
T
4560 LINE (0,0)-(256,192),PRESET
,B
4570 DRAW "BM26,82;C0;R3;U5;D5;R
6;U5;D5;R3"
4580 CIRCLE (30,152),30,0,.5,.18
,.29
4590 DRAW "C1;BM0,0;F10;BM255,0;
G10;BM0,192;E10;BM255,192;H10;C0
"
4600 DRAW "BM62,165;R5;E3;R10;F4
;E5;R2;F6;E2;R3;E4;R8;F3;R7;E5;F
2;R5;E5;R5;F6;R15;E2;F4;R3;F5;E2
;R2;E2;R2;E2;R2;E2;R2"
4610 DRAW "BM172,84;R3;B;U5;B;R5
;R3;B;R10;R5;B;D10;E1;F1;R1;E2;F
1;R1;B;D20;E10;R4;G12;H2;F2;E12;
R7;H1;L7;R7;F1;F12;L3;G3;L2;H3;L
3;H3;G3;L2;G3;H5;L5;B;U50;C1;E2;
R1;E2;R1;E2;R2;E2;F2;R3;F2;R2;F2
;R2;F2;R2;F2;R2;F2;R2;F2;R2;B;U5
;B;L7;L2;G2;H3;G2;H4;G3;L3;G2"
4620 DRAW "H3;G2;L3;H4;G3;L3;G3;
L2;G3;L2;G3;L2;G3;L2;B;R15;B;D5;
E3;R3;E2;R2;E2;R2;E3"
4630 PAINT (212,56),1,1
4635 GOSUB 4660
4640 A$=INKEY$:IF A$="" THEN 464
0:'***IF ENTERING ONLY 1 PROGRAM
 CHANGE THIS LINE TO READ.  4640
 GOTO 4640
4650 IF A$="R" THEN RUN:'***DELE
TE THIS LINE IF ENTERING ONLY 1
PROGRAM****
4660 '***FROSTY THE SNOWMAN***
4670 F$="L2O2GL4EL8FL4GL2O3CL4O2
BL8O3CL4DCO2BAGGBO3L8CL4DCO2BAL4
G;O3CO2EL8GAL4GF"
4680 F1$="EFL2G":F2$="EDL2C"
4690 S$="L2GL4AAO3CL8CO2L4BAGEFA
GFEL2EL4DDFFAAO3L2CCL8DL4CCO2BAL
2G"
4700 T$="L4GL8GGL4GGAL8GGL4GGAGE
GL2D"
4710 L$="L8BO3CL4DCO2BAGO3CO2L2E
L8GAL4GFL2EO3DL1C"
4720 PLAY "T5;XF$;XF1$;XF$;XF2$;
XS$;XF$;XF2$;XT$;XL$;"
4725 RETURN
4730 '***END PROGRAM #3**
```

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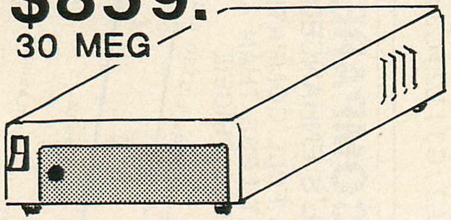

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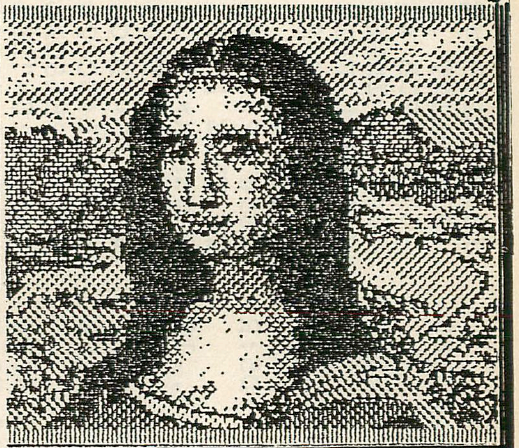

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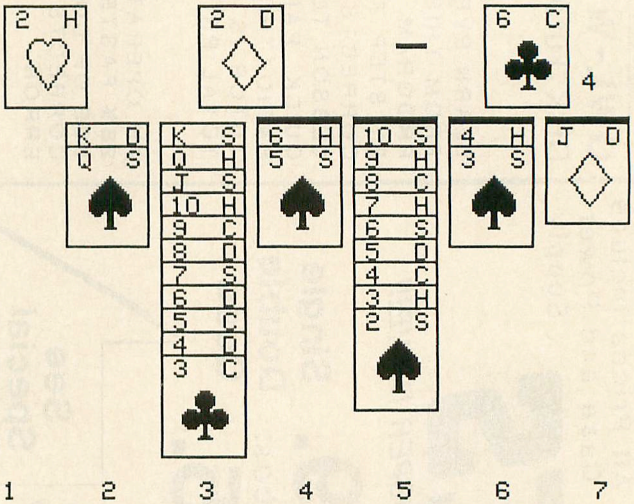
The Solitary Endeavor

By Tudor P. Jones



Solitaire is a computer version of the old standby favorite card game whose object is to put shuffled playing cards back into order.

Twenty-eight cards are dealt to the columns to start the game, and others are turned from the remainder, or display, and added to the columns or stacks as they appear. If they cannot be legally entered onto the columns or stacks, then they have to be left in the display until they are exposed once again.

The bottom card on any column may be moved either to its appropriate stack to continue the sequence, or to the bottom of another column. The visible display card can also be moved to its stack, or to the bottom of any column, but only in accordance with the usual rules. The columns must be in descending sequence and alternating color (diamond or heart on a club or spade).

One card is dealt face up by the computer to begin Column 1, and six more face down in a row, to begin columns 2 to 7. Another card is dealt face up on Column 2, and five more face down on columns 3 to 7. This is continued until there are seven piles of cards increasing in number from one to seven from left to right, with only the top card of each pile exposed.

As each ace becomes available, it should be moved to begin the stacks above the columns. Each stack is built up in suit and sequence to the king.

The 24 remaining cards are turned over three at a time. The third card is visible in the display. The number alongside the display indicates which card is visible.

After making any opening moves that are possible, press the space bar to turn over the next three cards. When all of the cards have been dealt this way to the display, another press of the space bar turns all of them over, and deals the top three cards of those remaining, with the third card being visible in the display, and available for play.

Press the down arrow and a column number to move a card from the display to that column. Any illegal move generates a NO message. The left arrow moves a card from the display to the stacks. Press the up arrow and column number to move a card from the bottom of a column up to the stacks. The right arrow plus two column numbers (from and to) moves a card or cards from column to column. A whole column, or part of a column, may be moved to another following the descending/alternating rule.

When a column is cleared to reveal the top of a face-down pile, the top card of this pile is turned over by the computer. The heavy line over a column indicates that unexposed cards are lying beneath the top card.

When a pile has been cleared to leave a space, it can only be filled with a king or a column of cards built on a king.

As in regular solitaire, the game can not always be completed. Sometimes, the cards are shuffled so it is impossible for the four stacks to be finished. Failure, therefore, is not always a sign of bad play. On the other hand, some games may be lost through bad play that would otherwise have come out.

(Questions about this program may be directed to Mr. Jones at 2338 Ryder Street, Ottawa, Ontario, Canada K1H 6X6, 613-731-3365. Please enclose an SASE when writing.) ☐

Tudor Jones, of Ottawa, Ontario, is a land surveyor, and in his spare time writes survey-oriented software.

140	97
210	89
300	231
450	110
630	180
790	193
990	57
1140	164
END	241

The listing: SOLTAIRE

```
10 CLS:CLEAR:DIMDECK(52),COL(7,2
0),C$(4),S$(4),N$(14),YC(7),STAC
K(4):R=RND(-TIMER):GOSUB1210:GOT
O190
20 N$=INKEY$:IF N$=""THEN20ELSER
ETURN
30 LINE(238,9)-(250,32),PRESET,B
F:N1=INT(D/10):N2=D-N1*10:IF N2=
1THEN N2=14
40 IF N1=1THEN N1=14
50 IF N1=0THEN60ELSE DRAW"BM238,
32;XN$(N1);BR4XN$(N2);":RETURN
60 DRAW"BM238,32;XN$(N2);":RETUR
N
70 IF CARD<14THEN RANK=CARD:SUIT
=1:RETURN
80 IF CARD<27THEN RANK=CARD-13:S
UIT=2:RETURN
90 IF CARD<40THEN RANK=CARD-26:S
UIT=3:RETURN
100 RANK=CARD-39:SUIT=4:RETURN
110 LINE(XC,YC)-(XC+11,YC+1),PSE
T,B:RETURN
120 LINE(200,0)-(232,39),PRESET,
BF:RETURN
130 LINE(XC,YC)-(XC+32,YC+39),PR
ESET,BF:RETURN
140 LINE(XC,YC)-(XC+32,YC+39),PS
ET,B:POKE200,XC+5:POKE202,YC+8:D
RAW"XN$(RANK);":POKE200,XC+24:PO
KE202,YC+8:DRAW"XS$(SUIT);":POKE
200,XC+17:POKE202,YC+32:DRAW"XC$
(SUIT);":IF SUIT=2OR SUIT=4THEN
PAINT(XC+11,YC+22),0,0
150 RETURN
160 IF COL(F,1)=0ORCOL(F,2)=0THE
N170ELSERETURN
170 LINE(XC,43)-(XC+32,44),PRESE
T,B:RETURN
180 XC=165:YC=1:GOSUB130:DRAW"BM
174,20;U6F4D2U6BR5R2FD4GL2HU4E":
FORN=1TO500:NEXT:GOSUB130:GOTO28
0
190 CLS:PRINT@10,"'SOLITAIRE'":P
RINT@35,"PRESS:-":PRINT@64,"SPAC
EBAR TO DISPLAY NEXT CARD.  DOWN
 ARROW & COLUMN NO. TO MOVE    C
ARD FROM DISPLAY TO COLUMN.":PRI
NT@160,"LEFT ARROW TO MOVE FROM
DISPLAY    TO TOP STACK."
200 PRINT@224,"UP ARROW AND COLU
MN NO. TO MOVE     CARD FROM COLU
MN TO TOP STACKRIGHT ARROW AND C
OLUMN NUMBERS     TO MOVE CARDS
FROM COL TO COL":PRINT@352,"'Q'
TO QUIT AT ANY TIME.       MOVE
 ALL CARDS TO TOP STACKS TO    W
IN."
210 PRINT@453,"(DECK BEING SHUFF
LED)."
220 FORI=1TO4:STACK(I)=0:NEXT:FO
RI=1TO7:YC(I)=45:FORJ=1TO20:COL(
I,J)=0:NEXT:NEXT
230 FORI=1TO52:DECK(I)=I:NEXT:FO
RI=1TO51:J=RND(52):N=DECK(J):DEC
K(J)=DECK(I):DECK(I)=N:NEXT:PRIN
T@453,"     PRESS <ENTER>.     ":G
OSUB20
240 PMODE4,1:COLOR0,1:PCLS(1):SC
REEN1,1
250 DRAW"BM14,190;XN$(14);":J=14
:FORI=2TO7:POKE202,190:J=J+38:PO
KE200,J:DRAW"XN$(I);":NEXT
260 J=0:K=24:FORI=1TO7:J=J+1:FOR
 N=1TO J:K=K+1:COL(I,N)=DECK(K):
DECK(K)=-1:NEXT:NEXT:XC=-36:YC=4
5:FORI=1TO7:CARD=COL(I,I):GOSUB7
0:XC=XC+37:GOSUB140:IF I=1THEN N
EXT ELSE LINE(XC,43)-(XC+32,44),
PSET,B:NEXT
270 CARD=DECK(3):GOSUB70:XC=200:
YC=0:GOSUB140:D=3:GOSUB30
280 XC=165:YC=1:GOSUB130:IF STAC
K(1)+STACK(2)+STACK(3)+STACK(4)=
52THEN300ELSE XC=166:YC=15:GOSUB
110
290 GOSUB20:IF N$="Q"THEN10ELSEI
F N$=CHR$(32)THEN320ELSEIF N$=CH
R$(10)THEN530ELSEIF N$=CHR$(9)TH
EN760ELSEIF N$=CHR$(94)THEN390EL
SEIF N$=CHR$(8)THEN1190ELSEGOTO2
90
300 DRAW"BM90,110;F4NE4D6BR10H2U
6E2R4F2D6G2NL4BR9H2U8BR8D8G2NL3B
R3BE10D7F3E2F2E3U7BR7D10BR7U10F8
D2U10":GOSUB20:GOTO190
310 REM START OF 'SPACE BAR'
320 DRAW"BM167,13;E4NL4NH4NU4NE4
NR4NF4D4":XC=200:YC=0:GOSUB130
330 IF DECK(1)=-1THEN180
340 D=D+3:IF DECK(D)>0THEN370
350 D=D-1:IF DECK(D)>0THEN370
360 D=D-1:IF DECK(D)<0THEN D=0:X
```

```
C=200:YC=0:GOSUB130:GOTO330
370 CARD=DECK(D):GOSUB70:XC=200:
YC=0:GOSUB140:GOSUB30:GOTO280
380 REM START OF 'UP ARROW'
390 DRAW"BM170,13;U5L2E4F4L2D5L4
":XC=183:YC=15:GOSUB110
400 GOSUB20:IF N$="Q"THEN280ELSE
IF N$<"1"OR N$>"7"THEN400
410 F=VAL(N$):IF COL(F,1)=0THEN1
80
420 IF F=1THEN F=14
430 I=20:DRAW"BM186,13;XN$(F);":
IF F=14THEN F=1
440 I=I-1:IF COL(F,I)=0THEN440EL
SE CARD=COL(F,I):GOSUB70
450 IF RANK<>STACK(SUIT)+1THEN18
0
460 STACK(SUIT)=STACK(SUIT)+1:XC
=SUIT*38-24:YC=0:GOSUB130:GOSUB1
40
470 XC=F*37-36:YC=YC(F):GOSUB130
480 COL(F,I)=0:IF YC(F)>45THEN Y
C(F)=YC(F)-9
490 GOSUB160
500 IF COL(F,1)=0THEN YC=45:GOSU
B130:GOTO280
510 CARD=COL(F,I-1):GOSUB70:YC=Y
C(F):GOSUB140:GOTO280
520 REM START OF 'DOWN ARROW'
530 DRAW"BM172,13;H4R2U5R4D5R2G4
":IF DECK(1)=-1THEN180
540 CARD=DECK(D):GOSUB70:IF RANK
<>1THEN610
550 GOSUB 120
560 STACK(SUIT)=STACK(SUIT)+1:XC
=SUIT*38-24:YC=0:GOSUB130:GOSUB1
40
570 IF D=0THEN370
580 I=D:D=D-1:CARD=DECK(D):GOSUB
70:XC=200:YC=0:GOSUB30:IF D>0THE
N GOSUB140
590 IF DECK(I+1)=-1THEN DECK(I)=
-1:GOTO280
600 DECK(I)=DECK(I+1):I=I+1:GOTO
590
610 XC=183:YC=15:GOSUB110
620 GOSUB20:IF N$="Q"THEN280ELSE
IF N$<"1"OR N$>"7"THEN620
630 F=VAL(N$):IF F=1THEN F=14
640 DRAW"BM186,13;XN$(F);":IF F=
14THEN F=1
650 IF RANK=13AND COL(F,1)<>0THE
N180
660 IF RANK=13 AND COL(F,1)=0THE
N GOSUB120:COL(F,1)=DECK(D):XC=F
*37-36:YC=YC(F):GOSUB140:GOTO570
670 C1=RANK:S1=SUIT:I=20
680 IF COL(F,1)=0THEN180
690 I=I-1:IF COL(F,I)=0THEN690
700 CARD=COL(F,I):GOSUB70:N=SUIT
+2:IF N>4THEN N=N-4
710 IF N=S1 OR SUIT=S1 THEN 180
720 IF C1<>RANK-1 THEN 180
730 GOSUB120
740 YC(F)=YC(F)+9:XC=F*37-36:YC=
YC(F):GOSUB130:COL(F,I+1)=DECK(D
):CARD=DECK(D):GOSUB70:GOSUB140:
GOTO570
750 REM START OF 'RIGHT ARROW'
760 DRAW"BM167,11;U4R5U2F4G4U2L5
":XC=183:YC=15:GOSUB110
770 GOSUB20:IF N$="Q"THEN280ELSE
IF N$<"1"OR N$>"7"THEN770
780 F=VAL(N$):IF F=1THEN F=14
790 DRAW"BM186,13;XN$(F);":IF F=
14THEN F=1
800 XC=165:YC=30:GOSUB110
810 GOSUB20:IF N$="Q"THEN280ELSE
IF N$<"1"OR N$>"7"THEN810
820 T=VAL(N$):IF T=1THEN T=14
830 DRAW"BM169,28;XN$(T);":IF T=
14THEN T=1
840 J=20:IF COL(T,1)=0THEN1060
850 J=J-1:IF COL(T,J)=0THEN850
860 CARD=COL(T,J):GOSUB70:HRANK=
RANK:HSUIT=SUIT:HYC=YC(F):HJ=J:I
=20
870 I=I-1:IF I=0THEN180
880 IF COL(F,I)=0THEN870
890 CARD=COL(F,I):GOSUB70:IF HRA
NK=RANK+1 THEN 920
900 I=I-1:IF I=0THEN180
910 HYC=HYC-9:IF HYC=36THEN180EL
SE890
920 N=SUIT+2:IF N>4THEN N=N-4
930 IF N=HSUIT OR SUIT=HSUIT THE
N 180
940 HI=I:YC(F)=HYC
950 J=J+1:COL(T,J)=COL(F,I):COL(
F,I)=0:I=I+1:IF COL(F,I)>0THEN95
0
960 I=HI:XC=F*37-36:IF COL(F,1)=
0THEN LINE(XC,45)-(XC+32,183),PR
ESET,BF
970 GOSUB160
980 IF HYC>45THEN YC(F)=HYC-9
990 LINE(XC,HYC)-(XC+32,183),PRE
SET,BF:I=20
1000 I=I-1:IF I=0THEN YC(F)=45:Y
C=45:GOSUB130:GOTO1030
1010 IF COL(F,I)=0THEN1000
1020 CARD=COL(F,I):GOSUB70:YC=YC
(F):GOSUB140
1030 J=HJ:YC(T)=YC(T)-9:XC=T*37-
36
1040 IF COL(T,J)=0THEN280
1050 YC(T)=YC(T)+9:CARD=COL(T,J)
:GOSUB70:YC=YC(T):GOSUB130:GOSUB
```

```
140:J=J+1:GOTO1040
1060 I=20:HYC=YC(F)
1070 I=I-1:IF I=0THEN180
1080 IF COL(F,I)=0THEN1070
1090 CARD=COL(F,I):GOSUB70:IF RA
NK=13 THEN 1120
1100 I=I-1:IF I=0THEN180
1110 HYC=HYC-9:IF HYC=36THEN180E
LSE1090
1120 YC(T)=45:YC(F)=45:HI=I:J=0:
XC=F*37-36:LINE(XC,45)-(XC+32,18
3),PRESET,BF:XC=T*37-36:YC=45
1130 J=J+1:COL(T,J)=COL(F,I):COL
(F,I)=0:CARD=COL(T,J):GOSUB70:GO
SUB140:I=I+1:IF COL(F,I)=0THEN11
40ELSE YC(T)=YC(T)+9:YC=YC(T):GO
SUB130:GOTO1130
1140 XC=F*37-36:I=HI-1:IF COL(F,
1)=0THEN YC=45:GOSUB130:GOSUB170
:GOTO280
1150 IF COL(F,2)=0THEN GOSUB170
1160 CARD=COL(F,I):GOSUB70:YC=YC
(F):GOSUB140
1170 I=I+1:IF COL(F,I)=0THEN280E
LSE COL(F,I)=0:GOTO1170
1180 REM START OF 'LEFT ARROW'
1190 DRAW"BM171,13;H4E4D2R5D4L5D
2":IF DECK(1)=-1THEN180
1200 CARD=DECK(D):GOSUB70:IF RAN
K=STACK(SUIT)+1THEN550ELSE180
1210 N$(0)="BUU4ER2FD4GL2H":
N$(1)="U4E2F2D2L3R3D2":
N$(2)="BU5ER2FDGL2GD2R4":
N$(3)="BR3L2HBU4ER2FDGLRFDG":
N$(4)="BR3U6G3DR4":
N$(5)="BR3L2HBU5R4L4D2R3FD2G":
N$(6)="BR3L2HU4ER2FBD2BL3R2FDG"
1220 N$(7)="BU6R4DG3D2":
N$(8)="BR3L2HUEHUER2FDGL2R2FDG":
N$(9)="BUFR2EU2L3HUER2FD4":
N$(10)="R2LU5LRUBR5R2FD4GL2HU4E"
:N$(11)="UDR3U6L2R4":
N$(12)="BR1HU4ER2FD4GLBUF2":
N$(13)="U6BR4G3F3":
N$(14)="R2LU6DLRBRBD5"
1230 S$(1)="U6D3R4U3D6":
S$(2)="BR3EGL2HU4ER2FBF":
S$(3)="U6R3FD4GL3":
S$(4)="BU1FR2EUHL2HUER2F"
1240 C$(1)="HUH2UH2UH2UHU3EUE2R3
F2E2R3F2DFD3GDG2DG2DG2DG":
C$(2)="L3ER2HU5G3L3H2U3E2R3FEH2U
3E2R3F2D3G2FER3F2D3G2L3H3D5F2L2"
:C$(3)="H3UH2UH3E3UE2UE3F3DF2DF3
G3DG2DG3":
C$(4)="L2EU7G3L2H2U4EUE7F7DFD4G2
L2H3D7FL2"
1250 RETURN
```

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Formatting Text Presentations to Suit Yourself

By Joseph Kolar
Rainbow Contributing Editor

Ready for more punishment? In this tutorial, we shall finish the demo program we began the last time around. You were asked to do some homework. If you did it, give yourself an A.

Load in your homework assignment. Refer to Listing 1 and key in lines 900 to 1999. If you just arrived on the scene, or neglected to do your homework, key in the entire listing. Run it.

The result is quite attractive. It is an interesting, alternate way to place lots of text on a screen. It takes some effort but once you understand the system, you will find it easy to use this technique. The ultimate viewer will find it relaxing to read along without being asked for any hands-on input, such as press this or do that. In fact, I call it the read along gambit.

List lines 910 and 920. Variables `A$` and `B$` contain strings of text that fill the balance of the text panel. Creating the actual sentences is the most difficult task. You must compose sentences that say what you want said and yet fit into the constraints of the text page or panel.

Here are some factors to take into consideration. There are 219 characters/spaces in `A$`. The maximum that I could have produced in this particular instance is 245. You can check it out if you are in the right part of the program, without using any program line number, by asking CoCo to print `L=LEN(A$)`.

Sometimes it is necessary to reword a sentence/paragraph to shorten it. At other times, it may be convenient to break it up into shorter bites. There are no hard and fast rules except the dictates of the situation. You must use the invisible vertical line gambit to format the text.

You must have a very good idea where you plan to locate the strings. You can do this by trial and error. If you do not feel comfortable with this method, feel free to try this next technique. Add the following lines:

```
930 PRINT@128,A$
931 PRINT@352,B$
932 GOTO932
```

Press CLEAR and type `RUN900`

Adjust the `PRINT@` locations as necessary. Alter the contents/length of any sentence to give it a better fit. This is called your layout. After finalizing your layout, make a note of the `A$` and `B$` locations. Did you notice how abruptly the text was presented? Obviously, it will require a lot of time to read the text. (More on this phase later.)

Delete lines 930 to 932. Other problems and considerations may crop up and will be confronted as we encounter them. Now that we have a good idea of the contents and appearance of the text panel, we can use the read along gambit, using `LEFT$` to create the routine that will work our will on CoCo.

List lines 940 to 1000. By trial and error, we determined that a time lapse of 50 units between the placement of each succeeding letter would afford us sufficient time to read the text as it is thrown onto the screen. (Feel free to use some other value, but be consistent throughout the program.)

Note in Line 940, `T=O`, etc., my typo error. Good-natured CoCo saved the day by reading it as `T=0`, etc.

Here is a fun thing! Temporarily insert `941 PRINTT;` to prove that CoCo sees `T=0`, and type `RUN900`. Question: Why did CoCo print `T` up in the corner and then print `T` of the balance of `A$`, underneath?

Study the placement of this line and the solution will come to you. `TRON` is helpful. Delete Line 941 and type `TROFF`.

List lines 940 to 1000. `A$` was put on first, using the location that you selected from your layout. It was done as explained in the last tutorial. `B$` was put on next, also in a nested loop, where Line 1000 is equivalent to lines 960 and 970.

Refer to last month's tutorial if you are encountering difficulty recalling what the two similar routines do.

Florida-based Joseph Kolar is a veteran writer and programmer and specializes in introducing beginners to the powers of CoCo.

Could we mask Line 970 and add `:NEXT` at the end of Line 960? Take time out to see what CoCo does.

List lines 940 to 1005. Add `:GOTO900` at the end of Line 100, and add `1001 GOTO 1001` and `1010 GOTO1010` in order to bypass part of the program and still retain the heading in the first panel. Now run it.

The last string, `B$`, was too long for the screen and CoCo was forced to scroll up in order to get to the next blank space. Scrolling upward pushed the name up and off the screen. The address remained. This did not look very professional.

One solution was to remove the remaining heading from the text panel. Line 1005 was one quick way to do it. Nothing was printed in the leftmost locations in the two top rows concerned. Delete Line 1001 and run.

It could have been centered vertically a little better. Care to have a go? I will later on because it irritates me.

Delete Line 1010. Insert `1125 GOTO 1125`. Watch the last part of the action. Now run. List lines 1005 to 1125.

I placed the program section separators, lines 1100 and 1300, in what seems to be the wrong places. They really should be just before the `CLS` lines. This is a real-live, hand-crafted program, with insertions and deletions, and to give it a feeling of spontaneity I decided to show warts and all. Remember, you are expected to rearrange the program lines to suit yourself.

Line 1110 kept the display panel on the screen for 1500 units (alter this value to suit), and then the screen was blanked out to prepare for the next panel. Run it. Delete Line 1125 and list lines 1130 to 1140.

The second panel had two batches of text. Using the same line formulations as in lines 980 to 1000, this text is centered for better appearance, then programmed in two segments.

Rekey `100 NEXT`. Add `6 GOTO 1120` and `1120 GOTO 1220`.

Suppose you wanted a breather after `C$` was placed on the screen to absorb what was written? Instead of a pause loop, you could add a bunch of spaces at the end to enlarge `C$`.

List Line 1130. Edit this line by moving the closing quote mark until it is under the 's' in "screen." Run it.

CoCo will have to cycle through all these additional blanks, because `T` is now increased to include all these spaces. They take time to loop through and, in effect, you get an extra pause without the addition of a conventional pause line. Run again.

You can adjust it by adding or removing these trailing spaces. Press BREAK. Now, edit Line 1140, and add some trailing blanks. Mask Line 1210 and delete Line 1220. Now run it.

You can see that the extra time CoCo needs to cycle through `T` multiplied by the number of trailing spaces, replaces the run-of-the-mill pause routine in Line 1210.

You were issued a challenge in `D$`. It wasn't demonstrated, but I am sure it can be done. Work on it later!

Rekey `6 GOTO 1130`. Remove any trailing blanks in lines 1130 and 1140. Unmask Line 1210. Insert `1135 GOTO1300` and `1350 GOTO 1350`. Now run.

Did you see what we did? We restored some lines to their original state and we bypassed the heading and the rest of the first panel. We picked up `C$` and bypassed the second panel. List lines 1300 to 1340.

If you mask Line 1305 and pull out `+X$` in lines 1320 and 1330, you may understand this better. Make these suggested changes and run.

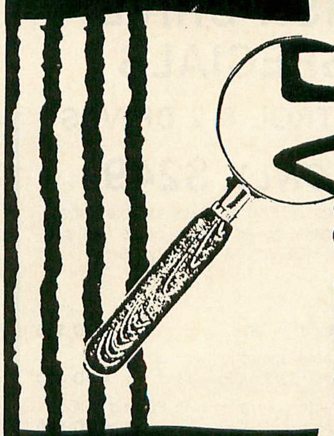
The text runs nicely across the screen, albeit backward, and it is kind of confusing until it is completely displayed. I thought it might look more dignified if it was led by an arrow, since there were a few unused spaces on the last row where it settled into its final home.

List lines 1300 to 1340. Unmask Line 1305. A small string, `X$`, was created four units long. Restore `+X$` in Line 1320. The length was increased by four, in the new string, `C$+X$`. Restore `+X$` in Line 1330. This meant that we have an enlarged string to display and, as we are starting from the right end of the string, our guiding arrow would lead the sentences as they flowed onto the screen. Run to make sure.

We don't need the arrow any more. In fact, it is an affront to our artistic sensibilities. We don't waste any time, and remove it forthwith. Line 1405 does the job. The location was chosen by trial and error. Delete Line 1350.

Trial and error does not mean that you throw up your hands and take a wild guess. No! You take a reasonable guess. What follows is how my mind ticks, if ever so slowly.

The target location was at the end of the eighth row. The ninth row begins with Location 256. I backed up a few



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digits to 250 and tried it out. When it was tested, I saw I knocked off the period. An adjustment was made.

As an aside, many moons ago, you were asked to make a training aid for yourself, on part of which, you were advised to make a `PRINT@` list of the starting locations of each row. I made mine and refer to it constantly. It is no big effort to look on top of my TV for the guide. You don't think for a minute that I remember all the nuts and bolts in CoCo's vast storehouse of knowledge?

Delete Line 6 and add 11 `GOTO 1410`. We move our starting offset to begin after `CLS`, so we could start in the middle of the third panel. Delete Line 1135 and run.

Line 1415 gave us a pause. Not too long. The last string, `C$`, had been redisplayed correctly, if not orthodoxly, so there wasn't much incentive to study it further. We had just located the arrow on the line above, so it wasn't mind-bending to pick up the correct location of the next program line, `A$`. The last panel, being well-formatted and well-centered, called for an abrupt end at Line 1999.

> *"These last cosmetic improvements separate the men from the boys."*

Delete Line 11 and run to make sure it is working properly. The last paragraph, `A$` (Line 1410), was located just below the unorthodoxly presented top paragraph, `C$`, to bind it in firmly and present the whole panel as a preconceived unit. To wit: It gives it a natural, flowing appearance and neat change of pace, first proceeding in one direction and then augmented, from the opposite direction.

Finishing a program always causes a quandary for the author. When is it really finished? A program is never finished. There is always something that can be polished to make it better.

It reminds me of an artist completing an oil painting in three days. Then he dabs a little here and a bit there for over three months, never quite satisfied with the result. When it is hanging in an art gallery, he can still spot areas where he could touch it up. It is never finished!

So, too, with this demo, I could make changes. However, at some point, unperfected though it may be, I have to say that this is it.

That is not to say that you can't continue to modify it. For instance, two changes could be made in the last panel. In Line 1330, change `64` to `32` and in Line 1405, change `251` to `251-32` or `219`.

The first panel bugs me. With the period in Line 920, CoCo is ornery and scrolls up, destroying the heading. Two solutions come to mind — omit the punctuation mark or revise `B$`. However, the text is exactly what I want to say and the only change I would tolerate is to change `THE` to `OUR`. This doesn't affect the length of `B$` — and I want my period! Neither, do I want to give up the blank row under the header.

`GOES TO PROVE` could be changed to `PROVES`, but the former has a sense of a continuing, repeated action. Thus, for me, there is no choice. Being stuck with panel one, I don't like the unbalanced, vertical centering. Despite the short holding pause at Line 1110, it could be scrolled up one row for a neater effect. Adding `1001 PRINT` solves that problem.

These last cosmetic improvements separate the men from the boys. As you run through this program, you will find something that I overlooked that offends your sensibilities. By all means, feel free to incorporate your improvements so it gets your stamp of approval.

Since the backward presentation is unreadable, why not speed it up? Change Line 1305 by inserting a space in front of the closing quote mark. To Line 1320, add `STEP2`. Give it a long pause at Line 1415, from `500` to `1500`.

We might just as well double-time it off the screen. Add the following lines:

```
1406 Y$="<--- ":FOR Z= 1 TO
  1500:NEXT
1407 FOR A= LEN(C$+Y$) TO 0
  STEP-2
1408 PRINT@64,RIGHT$(C$+Y$,A)
1409 FOR Z= 1 TO 50:NEXTZ,A
```

This spoils our final display. Help me to recenter the last `A$` display.

It is so easy to go off on tangents. Did you change Line 1430 from `256` to `128`?

One more tangent, and that's it! Add `1412 CLS8` and run. Add `;` at end of Line 1430 and run. Shades of tutorials past.

We had fun. Bit by bit, we digested a lot of useful information. Next month, we shall conclude this study and write lots of text to demonstrate another method you will enjoy using. ☐

```
210 ......216
600 ......149
920 .......87
1150 ......86
END .......13
```

The listing: DEMO

```
0 '<LISTING1> DEMO
5 CLEAR 500
10 CLS
20 A$="BETTY ANN WHITE"
30 B$="824 NE 56 ST.
40 C$="SEATTLE, WASHINGTON"
41 PRINT@8,LEFT$(A$,5);:FORZ=1TO
200:NEXTZ
42 PRINT MID$(A$,6,5);:FORZ=1 TO
 200:NEXTZ
43 PRINTRIGHT$(A$,5)
44 FOR Z= 1 TO 500:NEXT
45 CLS
46 '***
47 A$="JOSEPH KOLAR          "
50 FOR T= 0 TO LEN(A$)
60 PRINT@9, LEFT$(A$,T)
70 PRINT@41,LEFT$(B$,T)
80 PRINT@70, LEFT$(C$,T)
90 FOR Z= 1 TO 51:NEXT
100 NEXT
101 FOR Z= 1 TO 500:NEXT
102 GOSUB 2000
103 PRINT@9,A$
104 FOR Z= 1 TO 500:NEXT
110 L=LEN(A$)
120 FOR A=L TO 0 STEP-1
130 PRINT@30-A," "RIGHT$(A$,A)
140 FOR B=1 TO 51:NEXT
150 NEXTA
160 '***
210 A$="JOSEPH KOLAR"
220 L=LEN(A$)
230 FOR A=0 TO L
240 PRINT@213-A," "+LEFT$(A$,A)
250 FOR B=1 TO 200:NEXT
260 NEXT A
270 FOR Z=1TO500:NEXT
300 FOR A=L TO 0 STEP-1
310 PRINT@202,RIGHT$(A$,A)
320 FOR B=1 TO 200:NEXT
330 NEXT A
340 '***
400 A$="BETTY ANN WHITE"
410 FOR T= 0 TO LEN(A$)
420 PRINT@8,LEFT$(A$,T)
430 FOR Z= 1 TO 50:NEXT
440 NEXT
450 FOR Z= 1 TO 1000:NEXT
460 '***
490 L=LEN(A$)
500 FOR A=L TO 0 STEP-1
510 'PRINT@8,RIGHT$(A$,A)
511 PRINT@8,LEFT$(A$,A)
520 FOR Z=1 TO 200:NEXT
530 NEXT A
535 FOR Z= 1 TO 500:NEXT
540 '***
600 A$="JIMY OWEN WHITE"
605 PRINT@8,A$
606 FOR Z= 1 TO 500:NEXT
610 'FOR T= LEN(A$) TO 0 STEP-1
611 FOR T=0 TO LEN(A$)
620 PRINT@8,LEFT$(A$,T)
630 FOR X= 1 TO 200:NEXT
640 NEXT T
650 FOR Z= 1 TO 500:NEXT
660 '***
700 A$="BETTY ANN WHITE"
710 FOR T=0 TO 15
720 PRINT@8,RIGHT$(A$,T)
730 FOR X=1 TO 200:NEXT
740 NEXT T
750 FOR Z= 1 TO 500:NEXT
800 '***
810 B$="JIMY OWEN WHITE"
811 L=LEN(B$)
820 FOR A= 0 TO L
830 PRINT@22-A," "+LEFT$(B$,A)
840 FOR X= 1 TO 200:NEXT
850 NEXT A
860 FOR Z=1TO500:NEXT
900 '*****
910 A$="  THIS PROGRAM WAS CREAT
ED TO   FOOL AROUND WITH SOME OF
 THE    CAPABILITIES OF THE <LEF
T$> AND <RIGHT$> FUNCTIONS OF TH
E COCO.  AS A CHANGE OF PACE, T
HIS TEXTYOU ARE READING, WAS PLA
CED ON  THIS DISPLAY USING <LEFT
$>."
920 B$="  IT JUST GOES TO PROVE
THAT    THERE IS MORE THAN ONE W
AY TO   DO ALMOST ANYTHING WHEN
IT COMESTO PROGRAMMING THE BELOV
ED COCO."
940 FOR T= O TO LEN(A$)
950 PRINT@128, LEFT$(A$,T)
960 FOR Z=1 TO 50:NEXT
970 NEXT
980 FOR T=0 TO LEN(B$)
990 PRINT@352, LEFT$(B$,T)
1000 FOR Z= 1 TO 50:NEXTZ,T
1005 PRINT@0,"":PRINT@32,""
```

```
1100 '***
1110 FOR Z= 1 TO 1500:NEXT
1120 CLS
1130 C$="  A SECOND DISPLAY PANE
L WAS     ADDED TO SHOW ONE WAY T
O AVOID   <INPUT PRESS 'ENTER'> R
OUTINES.    THIS WAS DONE, AGAIN,
 TO SHOW HOW TO USE AN ALTERNATE
 WAY TO   GET THE TEXT TO THE SCR
EEN."
1140 D$="  CAN YOU CHANGE THE RO
UTINE TO UTILIZE <RIGHT$> INSTEA
D OF      <LEFTS> TO PUT THIS TEX
T ONTO    THE SCREEN?  TRY IT AND
 SEE IF   YOU CAN COME UP WITH A
WORKABLE ROUTINE!"
1150 FOR T=0 TO LEN(C$)
1160 PRINT@64, LEFT$(C$,T)
1170 FOR Z= 1 TO 50:NEXTZ,T
1180 FOR T=0 TO LEN(D$)
1190 PRINT@256, LEFT$(D$,T)
1200 FOR Z=1 TO 50:NEXTZ,T
1210 FOR Z=1 TO 500:NEXT
1300 '***
1305 X$="--->"
1310 CLS
1320 FOR A=0 TO LEN(C$+X$)
1330 PRINT@64,RIGHT$(C$+X$,A)
1340 FOR Z=1 TO 50:NEXTZ,A
1400 '***
1405 PRINT@251,""
1410 A$="  NOT VERY PRACTICAL!
BUT THAT IS ONE OF THE PERILS OF
 CREATIVEEXPERIMENTATION.  THE B
EGINNER  GETS TO DO LOTS OF USEL
ESS      THINGS, BUT IT IS STILL
 LOTS OF FUN!"
1415 FOR Z= 1 TO 500:NEXT
1420 FOR T=O TO LEN(A$)
1430 PRINT@256,LEFT$(A$,T)
1440 FOR Z= 0 TO 50:NEXTZ,T
1999 GOTO 1999
2000 '
2010 FOR X= 1 TO 10
2020 PRINT@9,"      WRONG!"
2030 FOR Z= 1 TO 20:NEXT
2040 PRINT@12,"           "
2050 FOR Z= 1 TO 40:NEXT
2060 NEXTX
2070 RETURN
```

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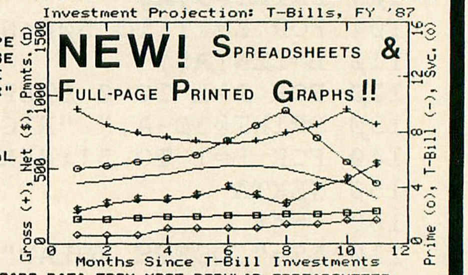

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The CoCo ROS, Part One

Add excitement to computing with your own Robot Operating System

By Dennis H. Weide

Last year at the New Mexico state fair, I had the opportunity to see a computer exhibit that had an IBM-compatible computer connected to a robot arm. The arm was controlled by BASIC's `LPRINT` command (`PRINT#-2` in the CoCo) which could be executed from the keyboard or from a BASIC program. These commands were sent to an interface unit as big as the computer itself where they were processed into signals that the arm could use. After a few minutes of experimentation, I was able to program the arm to pick up small objects and move them. I inquired about the price of the robot arm and interface, and was told that it cost more than $5,000.

It was a little out of my price range, so I decided to build something that resembles a robot of sorts and interface it to the CoCo. I had no idea where to begin so I just started reading everything I could find on the CoCo.

After a lot of research and experimentation, I came up with what I call the CoCo ROS (Color Computer Robot Operating System). While it is somewhat primitive, it gives those people interested in experimenting with their CoCo and robotics a chance to do so without spending a fortune.

Dennis Weide is a communications technician for AT&T communications in Albuquerque, New Mexico, where he programs AT&T and IBM PCs. He enjoys making toys and teaching computer programming.

Figure 1: Robotic Toy List

Name	Manufacturer	Price
Capsela 2000	Play Jour	$89.95
Robotix R-1500	Milton Bradley	$49.95
Robotix R-2000	Milton Bradley	$59.95
Digger Dan's Site Crane	Revell	$29.99
Digger Dan's Colossal Crane	Revell	$42.99
Erector Set	Ideal	$31.97
Robostrux	Tomy	$19.99
Chatbot	Tomy	$59.99
Verbot	Tomy	$59.99
Omnibot	Tomy	$279.99
Omnibot 2000	Tomy	$499.00

What's a ROS?

The CoCo ROS is a hardware circuit you build and a machine language program I've written to program it. It plugs into the cartridge port, but can be used with the multipack interface.

The circuit board plugs into the CoCo ROM port and allows you to connect other equipment to the CoCo. Many such circuits have already been designed and built, but I think you'll find this one is easier to program and it allows more I/O ports than most of the others. If you're new to computers or don't have much experience in circuit building, you may want to wait until you've read and studied all three parts of this article before you begin.

The ROS software consists of one BASIC program for cassette functions and one machine language program for writing, testing, modifying and executing the ROS program you write. The machine language program was written using *Deft* PASCAL and the compiled version will be available on RAINBOW ON TAPE for those who don't have *Deft* PASCAL.

ROS Defined

By now, you're probably asking what the ROS can do. Well, the ROS allows you to interface peripheral (external) *equipment* to the CoCo and program the computer to control external functions. There are many robot construction kits and radio-controlled toys currently on the market that can be controlled from your computer. Model railroad buffs will find the ROS a suitable computer-controlled system for use with their railroad layouts. The ROS is not designed for use with radio-controlled equipment using proportional controls.

Figure 1 is a partial list of some of the kits and toys that can be interfaced to the CoCo using ROS. I chose the Robotix R-2000 construction kit from the Milton Bradley Company over the others because it had gripper arms and four-geared, reversible motors. In about 30 minutes, I built a robot arm for testing the system. The kit is actually a toy and accuracy of movement leaves a lot to be desired, but I was able to overcome the limitations of the kit by adding microswitches to the robot arm and connecting them to the inputs on the circuit board. I'd be interested to hear about your successes (and failures) with ROS.

Let's Get Started

Next month, I'll introduce you to the interface circuit and give you tips on how to build it. And in the last installment I'll show you the software and explain how to program the robot you build. For now, let's look at how to build a simple logic tester that'll be useful for testing the ROS circuit when you build it.

While the ROS circuit is not difficult or complicated to build, you'll need to test it thoroughly after you build it to ensure there are no wiring errors.

Figure 2: Logic Tester

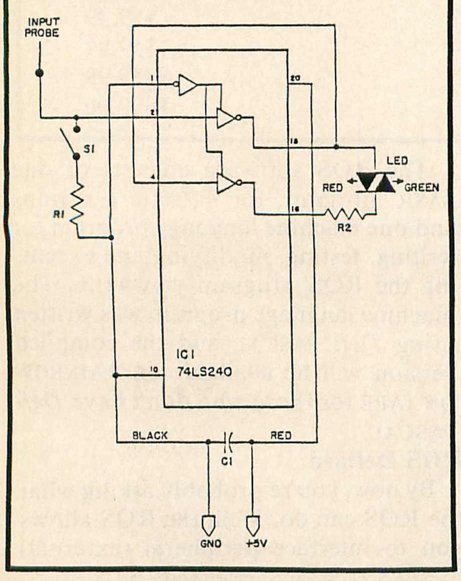


Figure 2 is a schematic diagram of a simple logic tester that's both inexpensive and easy to construct. It uses a 74LS240 Octal Buffer/Line Driver IC which is fully TTL and CMOS compatible. If you're experienced with digital circuit design, you'll notice that many other ICs could have been used in place of the one chosen. Feel free to try other types for your logic tester. I chose the 74LS240 because it's used extensively in the ROS circuit and can handle 40 milliamps of current, enough to drive the LEDs. The LEDs are the bi-color type that change color according to the direction of current flow through them.

Because the ROS circuit is digital, we're only concerned with high and low states when testing it. When the logic tester is connected to the circuit under test, the LED lights, indicating whether the point under test is high or low. Because of the simplicity of the tester, switch S1 is used to condition the input probe before reading. When the tester is connected to a +5-volt power source and switch S1 is open, the green LED should light. Closing S1 should change the LED to red. If your tester colors are reversed, reverse the polarity of the LED to correct the problem. If you can't find the right type of LED, use two LEDs connected in parallel but be sure only one conducts at a time. Resistor R2 is used to limit current through the LED.

Figure 3: Logic Tester Parts List

Designation		Part	Quantity	Price
IC 1		74LS240	1	.69
C1 .1mfd	*	272-1432	1	.49
R1 470 ohm	*	271-1317	1	5/.39
R2 10 ohm	*	271-1301	1	5/.39
LED		XC5491	1	4/1.00
Clip lead	*	270-370	2	2/1.39
		Input Probe	1	N/A
		Case	1	N/A
S1 SPST	*	275-406	1	2/.69
Misc. 30 guage & hookup wire				N/A

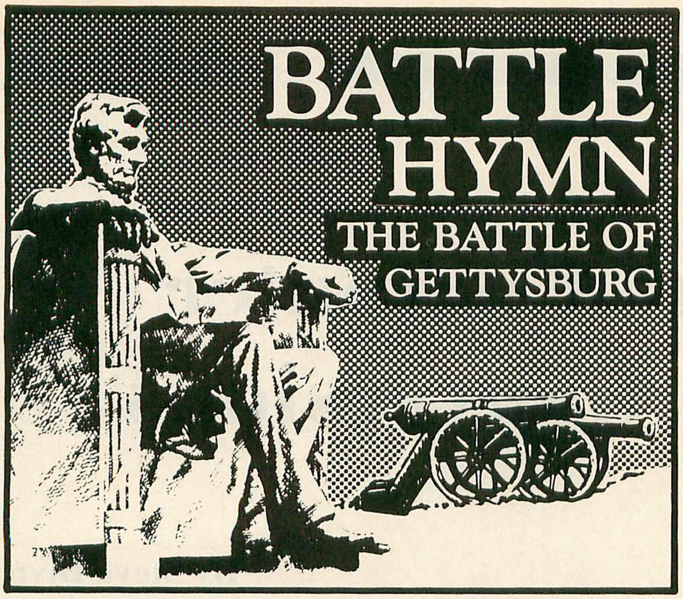
Note: * Denotes Radio Shack parts

To use the tester, connect the red lead to +5 volts and the black lead to ground of the circuit under test. Close S1 so that the red LED is on. Resistor R1 holds the input at ground potential until an incoming high overrides it. If the point under test is high, the green LED lights. If the red LED stays on, remove the probe from the circuit under test and open S1. This causes a high on the input to the test circuit and the green LED lights. If the point under test is low, the red LED lights. You'll have to switch S1 back and forth to verify the test results. If the point under test doesn't change the color of the LED after switching S1, then it's open.

I recommend you use a socket for the IC so you can easily replace it if the need ever arises. When you build the logic tester, decide in advance what type of case you're going to use to house it. I used a round plastic tube for the housing and a blunted cross stitch needle for the input probe. Be sure to make a good electrical connection on the input probe to prevent erroneous indications. You can use one of Radio Shack's micro-test clips (#270-370) instead of the probe, or you can make a one-piece, hand-held tester. Wiring isn't critical but be sure to use a .1 mfd capacitor across the +5-volt supply lead to prevent switching errors.

The parts I used for the logic tester can be purchased from almost any electronic supply store, but may be expensive. I purchased all my parts from a mail-order parts house (Jameco Electronics, 1355 Shoreway Road, Belmont, CA 94002) and saved a substantial amount of money. The only problem is that the minimum order is $20. Figure 3 is the parts list showing prices at Jameco. If you're going to build the ROS circuit, wait until next month to see the parts list. You'll be able to place one order for all parts.

That's it for this month. If you have any questions or comments, you can write to me at 14201 Marquette N.E., Albuquerque, NM 87123. Please include a self-addressed, stamped envelope if you want a reply.



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Play starts on the second day of the battle with Johnson, Early and Rodes facing an unreinforced Union line running from Culp's Hill down to Cemetery Hill and east. Player has early size advantage but must act quickly as Union reinforcements are seen arriving; and must form the line and charge up hill over a great distance. Where is Stuart?

Brigades must be turned to march or fire. Union troops must reload after firing.

Player may limber or unlimber cannon; must watch his fatigue factors and prevent troops from routing. The object is to force the flank and pin the enemy in a cross fire. Easier said then done. Very historic, with an Ark Royal touch.

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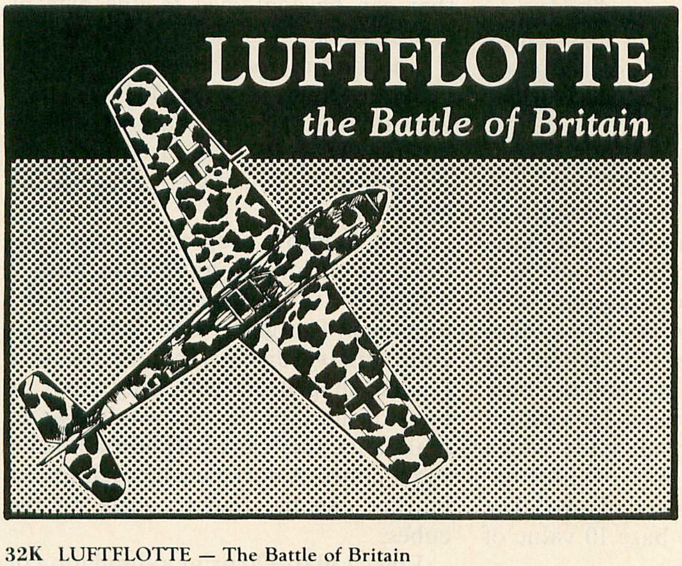

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Player watches as his flights head for London or Bath or Glasgow or lorad site 'j' or . . . It's up to you. There are 85 individual targets in the game.

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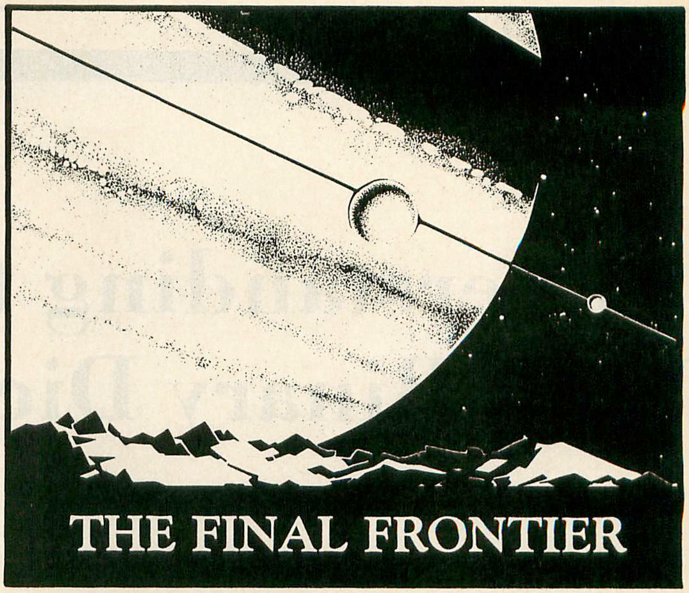

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EDUCATION NOTES

16K ECB

Understanding the Computer With Binary Dice Conversions

By Steve Blyn
Rainbow Contributing Editor

There usually comes a time when a child will ask how a computer works. You could be the one nearby when this question is asked, and you may regard this as an unlucky position to be in. This month's column and accompanying program is meant to give you some ideas about the topic, and help you resist the temptation to say, "Who cares, as long as it works."

A computer's native, or real, language is binary. This is the number system that uses only zeros and ones. A computer needs only the two numbers of the binary system to do its work because everything it reads ultimately gets translated into zeros and ones. An instruction read as a zero tells the computer to turn the circuit "off." An instruction read as a one tells the computer to turn the circuit "on."

The two digits, zero and one, are called bits. The word "bit" comes from the term Binary digIT. Computers translate instructions into a series of bits (zeros and ones) each time they read an instruction. Every letter, number and symbol gets translated into a series of eight bits. This is referred to as a "byte."

For example, the letter 'B' is translated into 01000010. Students will rightfully ask why we don't read and write programs in binary notation. A good reason is that it is not our normal way of doing math. We use higher level languages and our regular base 10 numbers. Computers contain compilers, which then convert our programs into the binary notation.

Here is a game to help introduce children to binary numbers. All the letters in the word RAINBOWS are associated with the numbers 0 to 7.

R	A	I	N	B	O	W	S
0	1	2	3	4	5	6	7

Have the children form new words from these number-letter associations.

0 — 1 — 3 = RAN
6 — 5 — 3 = ???
7 — 1 — 6 = ???

Children may then be encouraged to create their own puzzles. Explain to the students that computers operate in a manner something like this game.

A process similar to the game takes place inside a computer to interpret and store information. Computers use base 2 numbers. Each one stands for a power of two. Computers read bytes which usually contain eight bits of information. Each bit is a power of two. The table below shows the base 10 value of the powers.

The way to convert a binary number into our usual decimal representation is to add the value of all columns containing one and ignore all zeros.

The lowest number would be all eight columns containing zero (all in the "off" position), 00000000. The value would, of course, be zero.

The highest number would be all eight in the one or "on" position. The value would be 255, the highest number that can be contained in one byte of information.

The binary number shown in the previous diagram is 01001101. It is converted to the usual base 10 number by computing the sum of 64 + 8 + 4 + 1 which is 77. This byte represents the letter 'M'.

This month's program allows children to practice converting base 2 numbers to our regular base 10 numbers. The game is in the form of eight binary dice. A binary die is a regular shaped die with only zeros or ones on its face. If you would like to make a set, they can easily be made from sugar cubes. A dark pencil or felt tipped marker can be used to write on the cubes.

Lines 130 to 220 print a simulation of

Table: Base 10 and base 2 equivalents

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	power of two
128	64	32	16	8	4	2	1	base 10
0	1	0	0	1	1	0	1	base 2

Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.

a roll of each of the eight dice. They randomly display a zero or a one. Above the dice are the values in base 10 (decimal) they represent. The student merely adds the values of the ones to obtain the answer.

The computer figures out the answer in lines 240 to 310. The answer is variable J. Lines 340 and 350 check the user's answer (`C`) against the real answer (`J`). The correct answer is displayed when the user's answer is incorrect. After five tries, a score is given by Line 400. The child may either press E to end the program or G to go on and begin again.

As a follow-up activity to the program, children may try converting given base 2 numbers back into base 10 and then looking up their corresponding character strings (`CHR$`). The code values for `CHR$` may be found at the back of the manual that came with your computer. The values for the capital letters range from `A=65` to `Z=90`.

We hope that we have provided you with some ideas to enliven the explanation of this fairly dry topic. As always, we at Computer Island appreciate hearing from our readers. □

The listing: `BINARY`

```
10 REM"STEVE BLYN,COMPUTER ISLAN
D,STATEN ISLAND,NY
20 REM"BINARY DICE CONVERSIONS"
30 DIM VA(8)
40 Q=Q+1:IF Q=6 THEN 400
50 A$=STRING$(32,255)
60 CLS5:S=158:D=1:J=0
70 PRINT@6,"CONVERT TO BASE 10";
80 PRINT@38,"ENTER TO ROLL DICE"
;
90 EN$=INKEY$
100 IF EN$=CHR$(13) THEN 110 ELS
E 90
110 PRINT@96," 128  64  32  16
8  4  2  1"
120 PRINT@128,A$;:PRINT@192,A$;
130 FOR D=1TO 8
140 S=S+4
150 FOR T=1TO5:PRINT@S,CHR$(128)
;:SOUND100,1
160 R=RND(2)
170 IF R=1 THEN V=48 ELSE V=49
180 IF R=2 THEN VA(D)=1 ELSE VA(
D)=0
190 PRINT@S,CHR$(V);
200 SOUND 100,1
210 NEXT T
220 NEXT D
230 REM" VARIABLE J WILL KEEP CO
UNT OF THE CORRECT BASE 10 ANSWE
R."
240 IF VA(1)=1 THEN J=J+128
250 IF VA(2)=1 THEN J=J+64
260 IF VA(3)=1 THEN J=J+32
270 IF VA(4)=1 THEN J=J+16
280 IF VA(5)=1 THEN J=J+8
290 IF VA(6)=1 THEN J=J+4
300 IF VA(7)=1 THEN J=J+2
310 IF VA(8)=1 THEN J=J+1
320 PRINT@320,"":PRINT@320," WHA
T IS THE BASE 10 VALUE";
330 INPUT C
340 IF C=J THEN PRINT@394,"CORRE
CT !";:PLAY"O3L50CEGCEGGFEDC":RT
=RT+1
350 IF C<>J THEN PRINT@384,"SORR
Y,THE CORRECT ANSWER IS";J
360 PRINT@452,"PRESS ENTER TO GO
 AGAIN";
370 EN$=INKEY$
380 IF EN$=CHR$(13) THEN 40 ELSE
 IF EN$="E" THEN 390 ELSE 370
390 CLS:END
400 CLS8:PRINT@96,"YOUR SCORE IS
"RT"OUT OF 5 CORRECT";
410 REM"THE SCORECARD"
420 PRINT@256,"PRESS 'E' TO END
OR 'G' TO GO ON";
430 EN$=INKEY$
440 IF EN$="E" THEN 390 ELSE IF
EN$="G" THEN RUN ELSE 430
```

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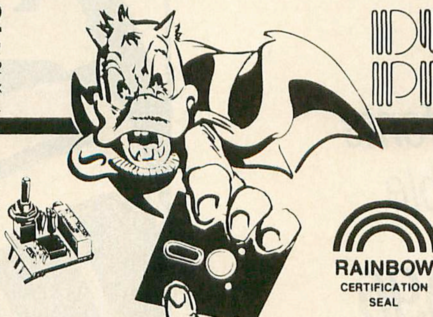

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@ SUMMARY

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If you use your spreadsheet program to keep track of your expenses then @ SUMMARY can help you analyze those expenses. For example, if you indicate a "Category" for each expense then @ SUMMARY will produce a report that shows a total for each category, the highest amount, the lowest amount and the average amount. In addition, @ SUMMARY can produce a hi-res line graph or bar graph of the analysis and allow you to place titles on the graph. A hardcopy of the graph can also be generated as well as saved to disk.

The analysis can be saved in a "data file" which can be loaded into DYNACALC or read in by @ SUMMARY for future additions to the analysis. If you use other Spreadsheets such as ELITE*CALC then you have added a graphing feature to your spreadsheet applications. The analysis can also be saved in an ASCII file which can be read by word processors for inclusion in a report.

@ SUMMARY is compatible with any spreadsheet program that can generate an ASCII text file of worksheets.

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**OS9 version does not have Hi-Res graphing and requires Basic09.*

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SIDEWISE RS-DOS **$24.95***

* RS-DOS version included FREE with DYNACALC®

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This is the same feature that is included in our MASTER DESIGN program. Since we felt you don't need to buy two graphics editing programs, we have made this feature available at a reduced price.

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See reviews in: July '84 Rainbow, Oct. '84 Hot CoCo

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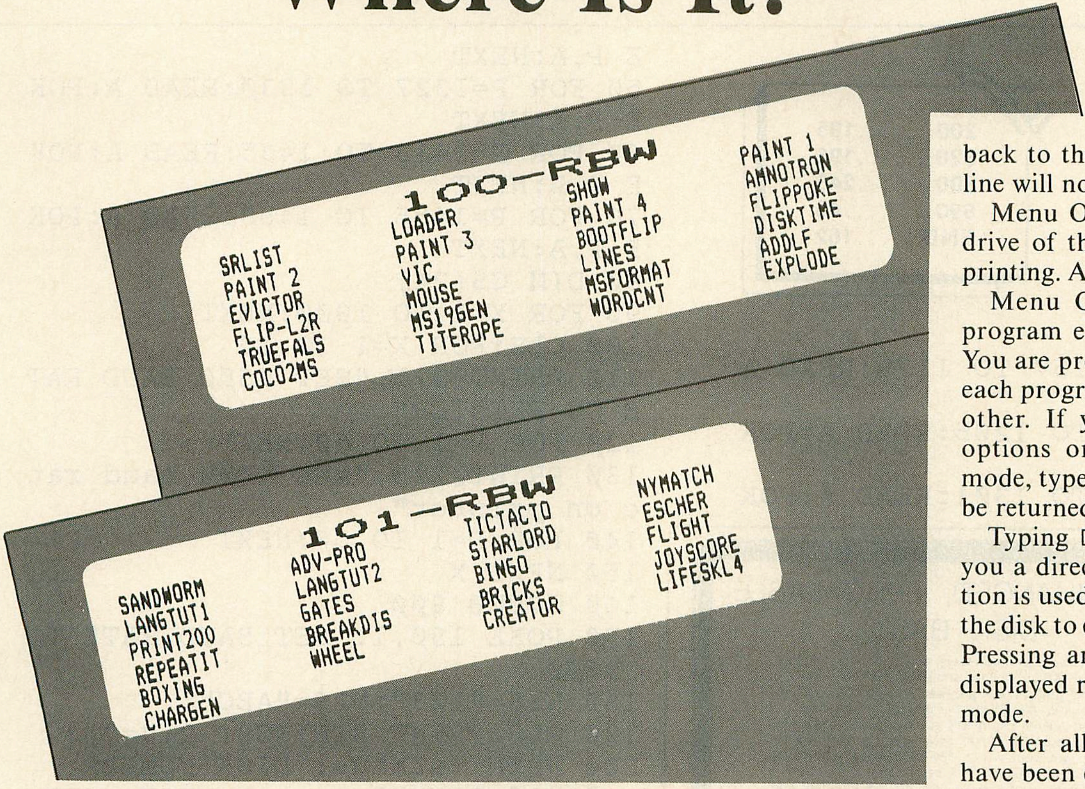
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By Brian Biggs

Do you list the directory of disk after disk to find the program you're looking for? Do your disks sit in a box, out of order, or even worse, on the floor in a pile? If so, *Disk Labeler* can help.

Disk Labeler numbers your disks and prints up to 24 program names on 3½-by-15/16-inch, one-across mailing labels.

To get started, type in the listing, save a copy, and run the program. The title screen appears and you are reminded to set the printer to 9600 baud. To change the baud rate, simply poke a different value into Location 150 in Line 170 using the table in Figure 1.

Brian Biggs is a junior at Westland High School in Galloway, Ohio. He enjoys baseball, swimming, working with his CoCo and reading THE RAINBOW.

Figure 1

600 baud	POKE 150,87
1200 baud	POKE 150,41
2400 baud	POKE 150,18
4800 baud	POKE 150,7

If the printer is not on, the program pauses until it is turned on, otherwise you see the main menu. The status section shows the current setup for printing. You can change disk number and disk code by pressing 1 and 2, respectively. The disk code can be any three-letter code that suits your needs.

Both the disk number and disk code must be three characters long. If they are less than or greater than three characters, *Disk Labeler* will automatically go back to the main menu. If you have already selected 1 or 2 from the menu and want to leave the contents the same, just press ENTER and you will go back to the main menu and the status line will not change.

Menu Option 3 lets you change the drive of the disk whose label you are printing. All drives (0 to 3) are available.

Menu Option 4 takes you to the program entry mode of *Disk Labeler*. You are prompted to enter the name of each program on the disk, one after the other. If you want to change menu options or abort the program entry mode, type `R` and press ENTER. You will be returned to the main menu.

Typing `D` and pressing ENTER gives you a directory of the disk. This function is used to get program names from the disk to enter them into *Disk Labeler*. Pressing any key after the directory is displayed returns you to program entry mode.

After all the programs on one disk have been entered, press P and ENTER. The screen will display the label with the program names printed in three columns. This three-column format must be used because of the size of the CoCo's screen, but the names will be printed in four columns on the label. If all the names are correctly spelled, press Y, and printing begins. Otherwise, press N and you are returned to the program entry mode.

After printing is over you are asked if you want to print the same label again. This function is used to line up the labels in the printer without having to type in all the program names again. If you do not want to print the same label again, type `N` and you will be returned to the main menu. To leave *Disk Labeler*, select main menu Option 5 and you can exit.

Disk Labeler is quite useful as written but, as is the case with most programs, it was written to be modified. One thing that could be added is a subroutine to alphabetize all programs entered, or a subroutine to read the programs directly from disk. I wrote *Disk Labeler* for a Star SG-10 printer. If you want to change the codes, an explanation of the printer codes I used, in the order they appear in the program, can be found in Figure 2.

Any modifications you have made or any questions you have can be sent to me at 3555 Rolling Hills Lane, Grove City, OH 43123. Or call (between 7 p.m. and 10 p.m.) (614) 878-1081. Please include an SASE if you want a response. ☐

Figure 2

`CHR$(27) "E"`	——	Emphasized print
`CHR$(27) "G"`	——	Double-strike print
`CHR$(27) "C" CHR$(6)`	——	Set page length to 6
`CHR$(14)`	——	One line expanded print
`CHR$(15)`	——	Condensed print
`CHR$(27) "A" CHR$(9)`	——	Set line feed to $^9/_{72}$ inch
`CHR$(13)`	——	Carriage return
`CHR$(12)`	——	Form feed
`CHR$(27) "@"`	——	Reset printer
`CHR$(7)`	——	Sound printer bell

200 195
320 196
500 245
690 43
END 162

The listing: LABELER

```
10 CLEAR1000
20 CLS:FOR P=1157 TO 1179:READ A
:POKE P,A:NEXT
30 FOR P=1189 TO 1205:READ A:POK
E P,A:NEXT
40 FOR P=1289 TO 1301:READ A:POK
E P,A:NEXT
50 FOR P=1327 TO 1330:READ A:POK
E P,A:NEXT
60 FOR P=1413 TO 1435:READ A:POK
E P,A:NEXT
70 FOR P=1455 TO 1458:READ A:POK
E P,A:NEXT
80 DIM G$(24)
90 FOR X=1 TO 1000:NEXT
100 CLS:FOR X=1 TO 10
110 PRINT@225,"SET 9600 BAUD RAT
E ON PRINTER"
120 FOR P=1 TO 50:NEXT
130 PRINT@225,"set 9600 baud rat
e on printer"
140 FOR P=1 TO 50:NEXT
150 NEXT X
160 GOSUB 800
170 POKE 150,1:'SET BAUD RATE TO
 9600
180 N1$="123":N2$="ABC"
190 CLS:PRINT STRING$(32,"=");
200 PRINT"status: DISK NUMBER
  ";N1$:PRINT"         DISK CODE
     ";N2$:PRINT"            CURREN
T DRIVE   ";D:PRINT STRING$(32,"=
");
210 PRINT@224,"1)CHANGE DISK NUM
BER":PRINT"2)CHANGE DISK CODE":P
RINT"3)CHANGE DRIVE":PRINT"4)ENT
ER PROGRAMS":PRINT"5)QUIT"
220 A$=INKEY$:IF A$="" THEN 220
230 IF A$="1" THEN GOSUB 830:PRI
NT@423,;:INPUT"NEW DISK NUMBER";
B$:IF LEN(B$)<>3 OR B$="" THEN 1
90 ELSE N1$=B$:GOTO 190
240 IF A$="2" THEN GOSUB 830:PRI
NT@423,;:INPUT"NEW DISK CODE";B$
:IF LEN(B$)<>3 OR B$="" THEN 190
 ELSE N2$=B$:GOTO 190
250 IF A$="3" THEN PRINT@423,;:I
NPUT"NEW DRIVE";D:IF D<0 OR D>3
THEN 250 ELSE 190
260 IF A$="4" THEN GOTO 330
270 IF A$="5" THEN PRINT@423,"AR
```

ADOS ENHANCED, EPROM-ABLE DISK BASIC

Now, you can supercharge Basic with an impressive array of extra features WITHOUT sacrificing compatibility! ADOS is compatible with virtually 100% of commercial software. Customizing utilities are provided to allow user-defined command abbreviations, baud rate, step rate, tracks per disk (35 or 40), support of double-sided drives, and more. After customizing ADOS, you can have it burned into an EPROM that plugs into the Disk Basic ROM socket, or just use it in RAM as a 64K disk utility. (EPROM + burning will cost about $20--we provide information concerning how you can have this done.) Features include: • repeat and edit of the last direct-mode command • 26 definable control-key abbreviations • automatic line-number prompts • DOS command • lowercase command entry (a fine complement to a Lowerkit or PBJ WordPak) • COPY (filename) to (drive number) • AE error override option • RAM command (64K) • RUNM command • text echoing to printer • ML monitor • text file scan • enhanced directory • error trapping • hi-res text utility included (42, 51, or 64 characters per line)

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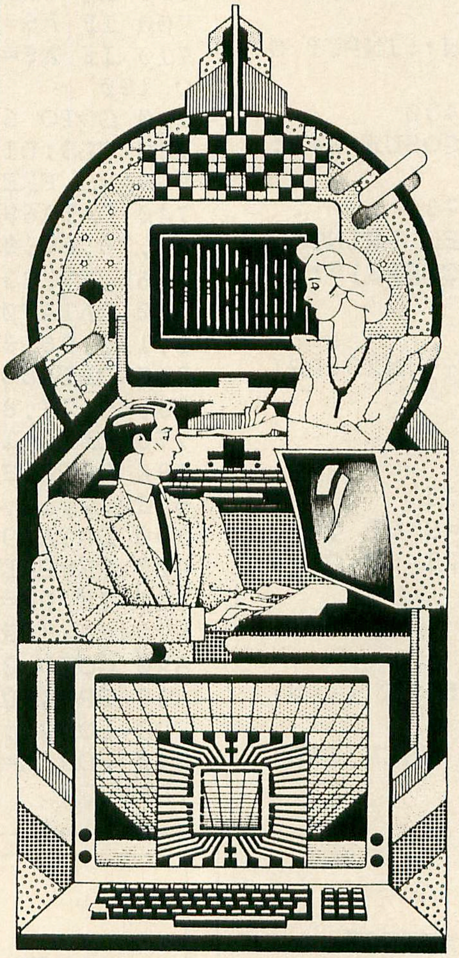

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```
E YOU SURE (Y/N)?":GOTO 290
280 GOTO 220
290 A$=INKEY$:IF A$="" THEN 290
300 IF A$="N" THEN 190
310 IF A$="Y" THEN CLS:PRINT"THA
NK YOU FOR USING THIS PROGRAM":E
ND
320 GOTO 290
330 FOR N=1 TO 24
340 CLS:PRINT@12,N1$;"-";N2$
350 PRINT@37,"ENTER THE PROGRAM
NAMES":PRINT
360 PRINT@97,"<P>RINT <R>ESTART
<D>IRECTORY":PRINT
370 PRINT" PROGRAM #";N;:INPUT G
$(N)
380 IF G$(N)="P" THEN 430
390 IF G$(N)="R" THEN GOSUB 840:
GOTO 190
400 IF G$(N)="D" THEN 730
410 IF LEN(G$(N))>8 THEN PRINT"T
OO LONG (LIMIT:8 CHARACTERS)":GO
TO 370
420 NEXT N
430 CLS:PRINT@12,N1$;"-";N2$:PRI
NT:PRINT
440 T=65
450 FOR Q=1 TO N-1
460 PRINT@T,G$(Q):T=T+11
470 IF Q=3 OR Q=6 OR Q=9 OR Q=12
 OR Q=15 OR Q=18 OR Q=21 OR Q=24
 THEN T=T-1
480 NEXT Q
490 PRINT:PRINT
500 PRINTTAB(5)"IS THIS OK (Y/N)
?";
510 A$=INKEY$:IF A$="" THEN 510
520 IF A$="Y" THEN 560
530 IF A$="N" THEN 330
540 GOTO 510
550 'START PRINTING
560 GOSUB 800
570 CLS:PRINT@236,"PRINTING"
580 PRINT#-2,CHR$(27)"E"CHR$(27)
"G"CHR$(27)"C"CHR$(6);
590 PRINT#-2,CHR$(14);"       "N1$
;"-";N2$;
600 PRINT#-2,CHR$(15);CHR$(27)"A
"CHR$(9)
610 FOR Q=1 TO N-1
620 PRINT#-2,G$(Q),
630 IF Q/4=INT(Q/4) THEN PRINT#-
2,CHR$(13);
640 NEXT Q
650 PRINT#-2,CHR$(12);
660 PRINT#-2,CHR$(27)"@";
670 PRINT#-2,CHR$(7);
680 PRINT@225,"PRINT SAME LABEL
AGAIN (Y/N)?"
690 A$=INKEY$:IF A$="" THEN 690
700 IF A$="Y" THEN 560
710 IF A$="N" THEN GOSUB 840:GOT
O 190
720 GOTO 690
730 CLS:DIRD:PRINTTAB(9)FREE(D);
"GRANS FREE";:EXEC44539:GOTO 340
740 DATA68,73,83,75,96,76,65,66,
69,76,69,82,96,104,80,82,79,71,8
2,65,77,83,105
750 DATA70,79,82,96,83,71,109,11
3,112,96,80,82,73,78,84,69,82
760 DATA66,89,96,66,73,76,76,96,
83,69,77,80,70
770 DATA113,121,120,117
780 DATA13,15,4,9,6,9,5,4,32,2,2
5,32,2,18,9,1,14,32,2,9,7,7,19
790 DATA49,57,56,54
800 PE=PEEK(65314)AND1
810 IF PE=0 THEN RETURN ELSE PRI
NT@486,"PRINTER NOT ON LINE!";
820 GOTO 800
830 PRINT@483,"MUST BE 3 CHARACT
ERS LONG";:RETURN
840 FOR X=1 TO 24:G$(X)="":NEXTX
:RETURN
```

Hint . . .

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Here is a print font for the DMP-105 printer that prints in large dark letters for the seeing impaired.

```
10 PRINT#-2,CHR$(27);CHR$(14)
20 PRINT#-2,CHR$(27);CHR$(23)
30 PRINT#-2,CHR$(27);CHR$(31)
```

To end the Large Print mode:

```
40 PRINT#-2,CHR$(27);CHR$(15)
50 PRINT#-2,CHR$(27);CHR$(19)
60 PRINT#-2,CHR$(27);CHR$(32)
```

Randy Daniels
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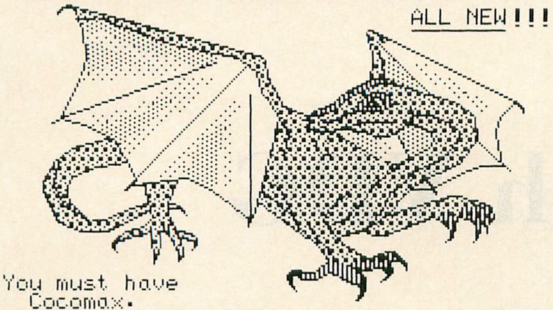

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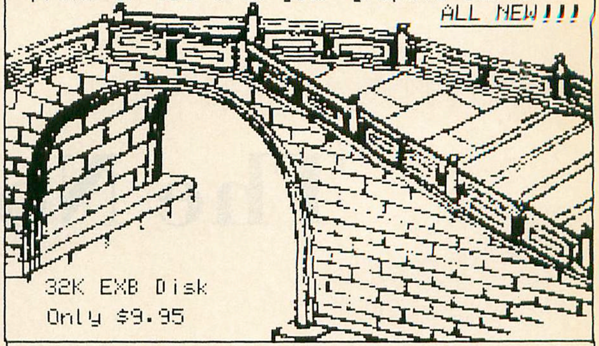

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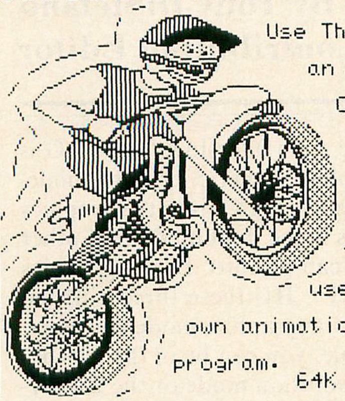

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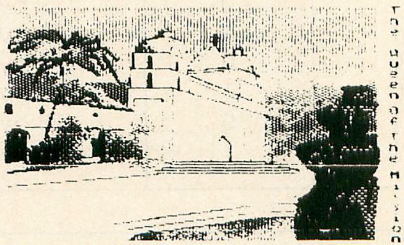

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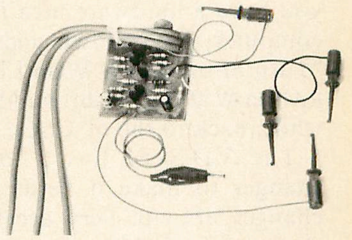

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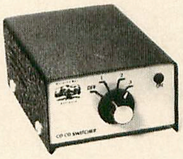

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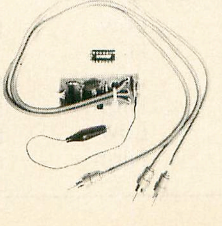

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The No-Switch VDG

By Tony DiStefano
Rainbow Contributing Editor

Two months ago I introduced you to the new VDG-T1. It came installed in the CoCo 2 B series. I guess I shouldn't say "new" any more; the CoCo 3 is out. I have ordered mine and, as you might well guess, I will turn the screw on it and see what is under the hood. I'm sure I will be able to come up with some hardware ideas on what we can do with this new CoCo 3. If any of you have a hardware idea for the new computer, jot it down and send it to "Turn of the Screw Wish List," care of RAINBOW at the Falsoft building. Meanwhile, back to the ol' CoCo 2.

The VDG-T1 has a lot of nifty changes to make it better. But these changes are not very accessible. The changes are hidden away deep inside CoCo. I wrote on how to dig these changes out so that you could make use of them. These changes included lowercase letters, inverse screen and a colored border. I discussed a couple of ways to access these. One was in software and the other was in hardware. The software way is a pain at best. You have to insert a BASIC line every time you printed to the screen. If you have a machine language program, forget it, the software just will not work.

The hardware way is a little better. You have three switches and set them up the way you want. The only problem is that the switches interfere with the graphics modes. So when you use graphics, you have to switch the three switches back to their original position. Again, what a pain. If you have a program that switches back and forth between graphics and text, you either have to play "flip the switches," or not bother with them at all and set them to their default settings. If that is the case, why put them in, in the first place? Don't despair, this month I'll show you how to eliminate the switches and still have the best of the VDG-T1.

First, let me review what the three pins and switches do. The three pins in question are pins 27, 29 and 30. The Motorola specifications manual for the MC6847T1 states that these pins are named GM2, GM1 and GM0 respectively. These three pins have dual purposes. There is another pin on this VDG known as the A/G Pin (Pin 35). This pin is an input. It controls whether the VDG is in Alpha/Numeric mode or in one of the many graphics modes. When this pin is logic state 0, or low, the VDG is in the Alpha/Numeric or text mode. When the pin is high it is in the graphics mode. This is the dual mode that other three pins can go into. In the graphics mode (A/G = HI) these three pins tell the VDG what graphics mode you want. For example, you can be in the 128-by-64 pixel resolution mode or the 256-by-192 pixel resolution. Table 1 shows all the different graphics combinations available with this VDG.

In the text mode (A/G LO) the three pins in question control in which text mode the VDG will display the text characters. For example, true upper- and lowercase characters, inverse lowercase characters, green border or black border. Table 2 is a description of how

Table 1

GM0	GM1	GM2	Description	
0	0	0	64 by 64	4 Color
0	0	1	128 by 64	2 Color
0	1	0	128 by 64	4 Color
0	1	1	128 by 96	2 Color
1	0	0	128 by 96	4 Color
1	0	1	128 by 192	2 Color
1	1	0	128 by 192	4 Color
1	1	1	256 by 192	2 Color

Table 2

Pin No.	Pin Name	Logic Level	Function
30	GM0	Low	Inverse Lowercase characters.
30	GM0	High	True Lowercase characters.
29	GM1	Low	Normal green screen.
29	GM1	High	Inverse black screen.
27	GM2	Low	Black border.
27	GM2	High	Colored border.

Tony DiStefano is a well-known early specialist in computer hardware projects. He lives in Laval Ouest, Quebec.

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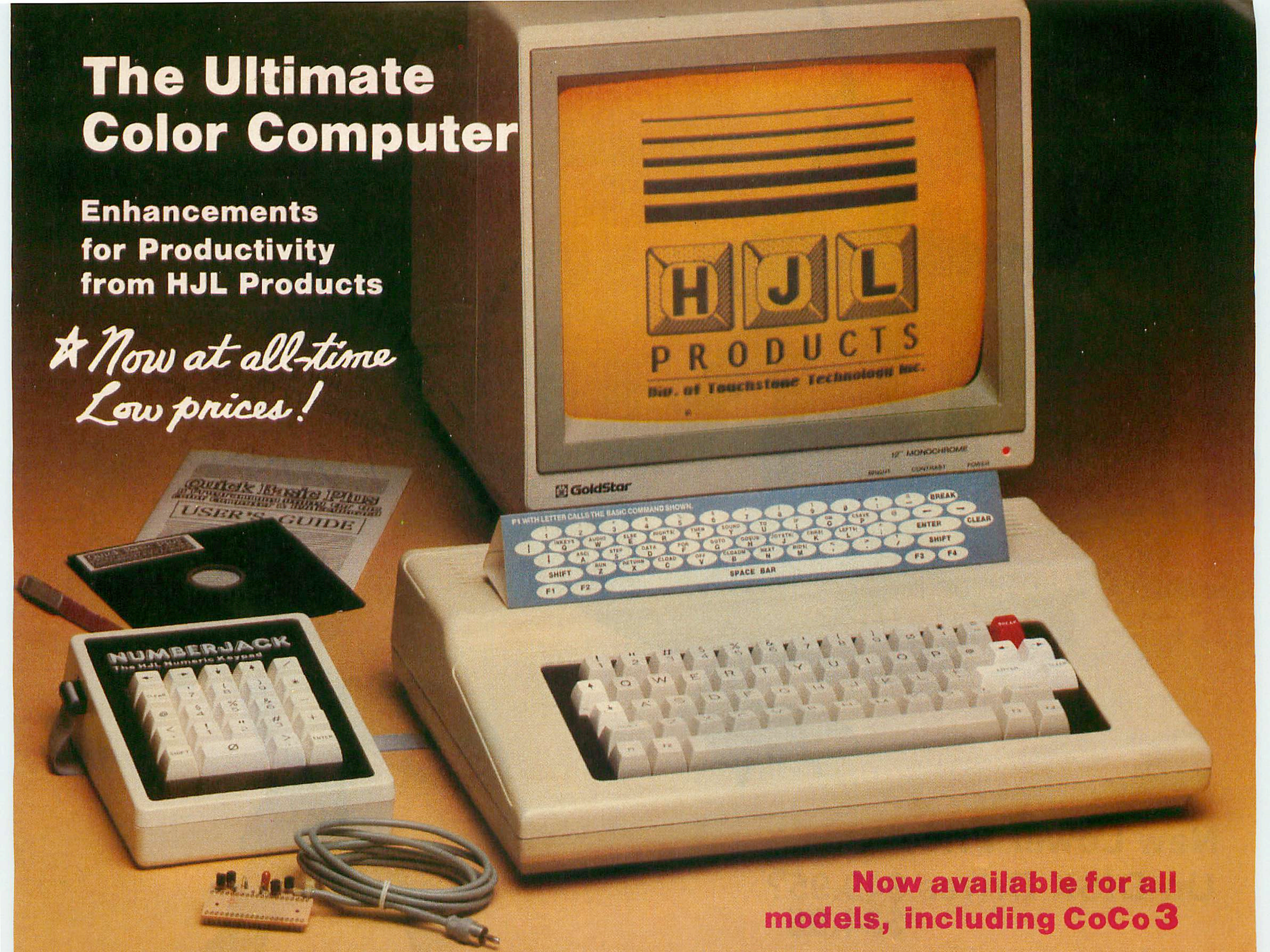

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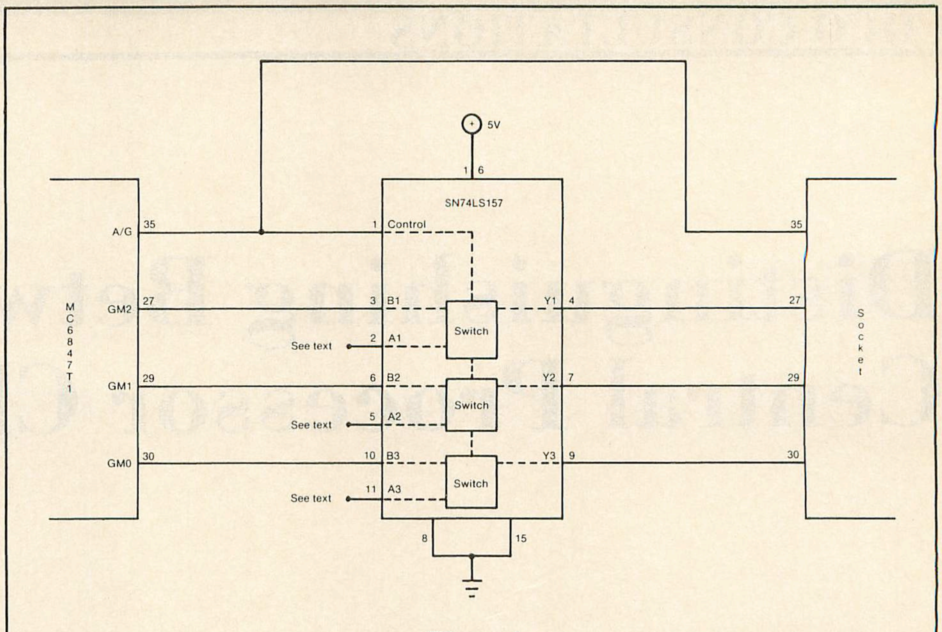

Figure 1

the three pins affect the text display on your screen.

The three control pins and the A/G pin are all inputs. To control them, the CoCo uses four pins on a PIA (Peripheral Interface Adapter). By now we are all familliar with the idiosyncrasies of Color BASIC. It controls these pins according to the old 6847 VDG, not the T1 VDG. Two articles ago I told you how to use switches to get around this. In last month's article I showed you how to hook up the T1 VDG to an old CoCo. This time I'll use an electronic switch to do the same switching action. With this modification, you won't have to fiddle with switches. It's compatible with all software. This modification will work with any CoCo that has the new T1 chip installed. The main part you will need is a TTL logic chip, the number is SN74LS157. Unfortunately, it is not available at your local Radio Shack store, but you can get it at any good electronics shop.

This chip is a quad 2-to-1 data selector. For each of the four gates, there are two inputs (A and B) and one output (Y). It also has a control line. The way it works is that when the control line is low, the output Y is the same level as the A input and disregards what is at input B. When the control line is high, the output Y is the same level as the B input and disregards what is at input A. Can you see it coming? We can use this chip to control the three pins of the T1 VDG and use the A/G line to control the selector chip.

Look at the schematic in Figure 1. It shows the wiring to this modification. I disconnected the three output pins of the PIA (that connects to the VDG). These three pins now go to the B input on three of the four gates on the selector chip. The outputs of these three gates go to the VDG. The fourth gate is not used. I have also connected the control pin of the selector chip to the A/G pin of the VDG. When the CoCo is in the graphics mode, this pin is high. This makes the control pin on the selector chip high also. When the control pin is high, the Y output will follow the B input. Given that the PIA pins are connected to the B inputs, when the control pin is high, it is as if the selector chip were not even there.

Now, when the CoCo is in text mode, the A/G pin is low. Since the control pin of the selector chip is connected to the A/G pin (in the text mode), the control pin is low. What happens when the control pin of our selector is low? The Y outputs follow the A inputs. What did you connect the A inputs to? Well, that all depends on how you want the text mode to look. Each of the three pins does something different. For example, the pin that connects to Pin 30 controls true lowercase characters or inverse lowercase characters. Table 2 shows what each pin does.

When you have picked which mode you want, you have to connect the A input to match that mode. When that mode requires a low, you have to connect that A input to ground or Pin 8 on the selector chip. When that mode requires a high, you have to connect that A input to 5 volts or Pin 16 on the selector chip.

The construction of this modification is typical of my projects. You need all the regular tools. Some people don't like to cut and solder directly on chips and PC boards. In that case you will need a 40-pin socket. I used a socket on this one. I hollowed out the center of it and used the space to put the selector chip in. If you don't want to use a socket, just piggy-back the selector chip on top of the VDG. If you use a socket, pry up pins 27, 29 and 30 so they do not go back into the socket. Use the empty pinhole as the connection to the PIA. If you don't use a socket, cut VDG pins 27, 29 and 30 and pry them up. Make sure you cut the pin high enough so you can solder to the stub that is left; it is the connection to the PIA. Either way, make sure you don't cut A/G Pin 35. Even though we are using this pin, the VDG still needs it too. Remember, the Y outputs of the selector chip go to the VDG, and the B inputs come from the connection that used to go to the VDG.

If you made last month's mod that puts the new VDG into the older CoCo, make sure you don't break any wires. If you used a socket to do it, you can use the same socket in last month's project for this one. You save a socket.

Well, that's it. When all the connections are done, close up the computer and try it. Check to make sure that all the modes work and that the text mode is the mode you want.

CORRECTIONS

"Esch-A-Sketch" (August 1986, Page 75): Eric White has written to correct a packed line in *Escher*. Using the extend option of the `EDIT` command, add the following characters to Line 280:

```
TO 450
```

so that the last statement in the line is `GOTO 450`.

For quicker service, Corrections will be posted on Delphi as soon as they are available in the Info on Rainbow topic area of the database. ***Just type*** **`DATA` at the CoCo SIG prompt and `INFO` at the Topic? prompt.**

Distinguishing Between Central Processor Chips

By Marty Goodman
Rainbow Contributing Editor

• *What is the difference between the 6809E central processor chip used in the CoCo 1 and 2 and the 68B09E used in the CoCo 3? What is the difference between the 6809 and the 6809E?*

Don Hitko
(DD)
Burton, MI

The 6809E found in the CoCo 1 and 2 was rated by Motorola to run at no more than 1-MHz clock speed. Motorola also made versions of that same chip called 68A09E and 68B09E rated to run at 1.5- and 2-MHz clock speeds respectively. Most 6809Es will run at speeds higher than 1 MHz, but the reliability of such operation is not vouched for by Motorola. In some of the later models of the old CoCo 1 and 2, Tandy used the 68A09E instead of the 6809E. Other than speed rating, the chips are identical.

The 6809 family also is divided into two sub-families of chips: those that require external sources for their separate 'E' and 'Q' clock signals, (designated by the added letter 'E'), and those that generate clock signals themselves with merely a crystal added. The 'E' series is the one used in the Color Computer family. The non 'E' series of 6809s are typically used in smaller, dedicated applications. For example, as part of the "smarts" of Radio Shack's CGP-220 ink-jet printer.

• *My old CoCo 1 controller has been behaving erratically over the last few weeks. The drive motors seem to go on of their own accord at times. Recently when I powered up the machine the drives were always on. They still would do proper disk access. I replaced the 1793 controller chip and the problem persisted. Then I exchanged U2 with U3 (the two 7416 chips) and now the controller works fine.*

Art Flexser
(ARTFLEXSER)
Miami, FL

The control of drive spindle motor is not affected by the 1793 controller chip. This control is mediated by a 7416 (inverting open collector buffer) numbered U2 on the circuit board. (There is a second 7416 chip, called U3, used in another part of the circuit that has nothing to do with the motor on circuit). Further back, there is a 14174B (CMOS Hex D flip flop) (U8) used to create the port at FF40, which is used for motor control and drive select. All of these chips are socketed.

You were very lucky. On U3, *only* three of the six gates are actually used by the disk controller, and the gate used for motor control in U2 is one of the unused gates in U3. This explains why your swap resulted in a working controller. I recommend you replace both of the 7416 chips, because I would hold suspect any chip that had one bad gate and be reluctant to use it long even if the other gates appear to work. Also, I recommend replacing both 7416 chips

---

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. Marty is the database manager of RAINBOW's *CoCo SIG on Delphi. His noncomputer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.*

with 7406 chips. The 7406 chip is identical to the 7416 chip in its pin out, and in its logical function, but it is rated to sink up to 30 volts, while the 7416 is rated to sink only up to 15 volts.

• *I just got a Chinon half-height, double-sided disk drive. When I insert a disk into it and shut the door, it spins for a couple of seconds. Is this OK?*

Mark Camp
(MARKCAMP)

The automatic spinning after disk insertion is an intentional feature added to some of the newer half-height "smart" disk drives for the purpose of seating the disk in the drive. Such drives often also spin the disk as you take it out and leave the drive spinning a few seconds after your drive select light goes out.

• *I have heard there is a problem using the CoCo 3 with existing multipack interfaces. I own an old gray multipack and an ancient disk controller (that requires 12 volts). What do I need to do to make these work with the CoCo 3?*

Mike Himowitz
(MHIMOWITZ)
Baltimore, MD

Because of a bug in the PAL chip on the multipack, the slot-select port address ghosts from FF7F to FF9F. If you have the old gray multipack or if you have one of the old, large, white-cased multipacks, you will probably be able to fix it by ordering a replacement PAL chip from Tandy. Ask your local Radio Shack store to order part number AXX - 7123 from National Parts. Say it is for the multipack, Catalog No. 26-3024. The price for the chip is $7.50.

• *I have a 64K CoCo and want to hook it up to a monitor. How do I do this? What type of monitor should I buy? I am primarily interested in using my CoCo as a word processor.*

Nicolas Bardino
Whiting, NJ

First you need to install a device often called a "video driver." This device creates the signal needed to drive such a monitor.

Monitors used on the CoCo 1 and 2 come in two different varieties: composite video monochrome and composite video color monitors. The monochrome monitors usually come in either green or amber screen varieties. If you are doing text processing, I recommend you not buy a color composite monitor. They produce nearly unreadable text screens. Get a monochrome composite monitor and the driver needed to make it work. The result will be a crisp text screen, even in 64-column mode. The only way to judge any brand of monitor is to look at the display it produces on your CoCo. Manufacturers' specs are worthless for determining which monitor will look better. Every "computer grade" composite monochrome monitor I have seen produces a reasonably clear image on the CoCo, so it is nearly impossible to go wrong regardless of which brand of monitor you buy.

For those of you about to buy a CoCo 3, note that 80-column text can be resolved on analog RGB monitors that are supported by the CoCo 3. But even on an expensive RGB color monitor, text will not look fully as clear as it will on a monochrome monitor. So if you plan to use the CoCo 3 mostly for text, you might want to consider buying a monochrome composite monitor. The CoCo 3 has a composite video output that will drive a monochrome monitor, though you may have to tell OS-9 and other software that you are using a monochrome monitor in order to get the image to look quite right.

Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P.O. Box 385, Prospect, KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

For quicker response time, your questions may also be posted in the FORUM section of RAINBOW's CoCo SIG on Delphi. In FORUM, type ADD and address your questions to the username MARTYGOODMAN. Marty is on most every evening to respond to FORUM messages. Other CoCo SIG members may also reply to questions posted in this public message area. Please be sure to leave your name and address in any FORUM questions, since those of wide interest will be selected for publication in this column.

PRINTERS!

NEW! Okidata 192+ (Par. or Ser.)	$370
NEW! Okidata 193 (Parallel)	$540
NEW! Okidata 193+ (Serial)	$610
Okimate 20 Color Printer	$135
Fujitsu 2100 (80 col.)	$410
Fujitsu 2200 (132 col.)	$520
Toshiba 321 (Par. or Ser.)	$510
Qume Letterpro 20 (Letter Qual.)	$445
Silver Reed 420 (Daisy Wheel)	$240
Silver Reed 600 (Daisy Wheel)	$575

(Add $10 Shipping for Printers)

ACCESSORIES!

Taxan 12" Green Monitor	$125
Taxan 12" Amber Monitor	$135
Table Top Printer Stand w/Slot (80 col.)	$30
Table Top Printer Stand w/Slot (132 col.)	$45
Stand w/Diskette Storage (80 col.)	$47
Stand w/Diskette Storage (132 col.)	$57

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NEW CATALOGS Radio Shack has announced its three new computer catalogs — the *1987 Tandy Computer Catalog*, the *1987 Radio Shack Software Reference Guide* and the *1987 Radio Shack Educational Software Reference Guide*. The catalogs are now available free of charge at more than 7,000 Radio Shack stores, Computer Centers and participating dealers nationwide. The *Tandy Computer Catalog* features 176 new items, including our favorite Color Computer 3. The software reference guides are excellent sources of Radio Shack and third-party products for Tandy computers.

OS-9 TIDBITS Microware has announced that Thomson SIMIV of Paris, France, has licensed OS-9/68000 for the software nucleus of the recently announced European Education Standard microcomputer system. Three major European electronic companies have previously signed an agreement to cooperate in the development of a European standard for 16-bit microcomputers incorporating OS-9/68000.

Also, Force Computers GmbH has signed a license with Microware Systems Corporation for the distribution of the OS-9/68000 Operating System. Under the agreement, Force will be able to offer OS-9 to new and existing users of its VME-based 68000 processor boards and peripherals.

These announcements reflect OS-9's rapidly increasing acceptance as the standard operating system for 68000-based personal computers. We've known it all along with our CoCos.

BOOKS, BOOKS, BOOKS Howard W. Sams & Co. has kept its tradition of providing technical material to computer experimenters, hobbyists and professionals. Publications recently released include *Computer Connection Mysteries Solved* and *Experiments In Artificial Intelligence for Microcomputers.*

Computer Connection Mysteries Solved covers topics such as the RS-232 interface, cabling, monitoring and testing gadgets. Retail price for the 272-page manual is $15.95.

Experiments in Artificial Intelligence for Microcomputers covers game-playing problems, problem solving, computer analysis of arguments and natural language processing as well as several other topics. Retail price for this 176-page work is $14.95. *Sams books are available through bookstores, computer retailers and electronic distributors, or directly from Sams by calling (800) 428-SAMS.*

PURGE THE SURGE New from Networx is Wire Cube Plus, a surge suppression device designed to protect both computers and modems. This device includes a single AC outlet and a phone line connection in one box, which is designed to be plugged into the wall. Energy is absorbed by a two-stage silicon/MOV transient suppressor. The device's two-stage silicon/gas tube for tip-gnd and ring-gnd prevents disruption of modem operation by shunting harmful energy on modem lines to ground. Price for the Wire Cube Plus is $39.95. *Contact Networx, 203 Harrison Place, Brooklyn, NY 11237, (718) 821-7555.*

SPEAKING OF MODEMS Practical Peripherals is now offering a standalone 1200 bps modem, the Practical Modem 1200 SA, which is fully Hayes-compatible, includes auto-answer/auto-dial capabilities, supports virtually all communications software and includes an upgrade path for a programmable enhancement card. The enhancement card, soon to be released, can be used for buffering, programmable protocol conversion, security, time/date logging and other functions that can be programmed or downloaded from a host computer. Features of the Practical Modem 1200 SA include semi-permanent storage of up to 10 telephone numbers, menu-driven configuration, pulse or tone dialing and a volume-controlled speaker. Two modular jacks accommodate voice and data calls. Price for the Practical Modem 1200 SA is $239. *Contact Practical Peripherals, 31245 La Baya Drive, Westlake Village, CA 91362, (818) 991-8200.*

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An introduction to the Color Computer III !!! Compares differences between the CoCo I/II and the NEW CoCo III.

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- New Ext. Basic 2.0 cmds
- New Memory Map
- 128K Memory Tester

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It's here! A drawing program for the CoCo III using the new Enhanced graphic features. Requires 128K CoCo III w/Disk
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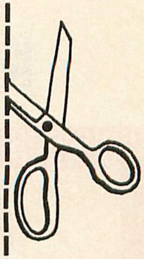

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COLORCOM/E - A complete smart terminal package! Upload, Download, Hi-Res (51X24) screen, 300/1200 Baud, Offline Printing. 32/64K Disk* - $39.95
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Hayes compatible! Super for the DELPHI & Compuserve CoCo Sig! 300/1200 Baud, Auto-dial/answer
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SEIKOSHA
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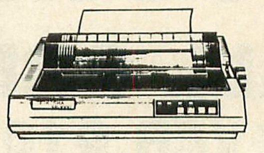

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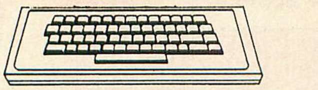

RS 26-3016 Low Profile CoCo Keybd. Fits all CoCoII's, "F" & TDP-100's WAS $39.95 NOW $19.95
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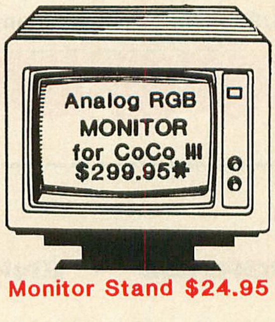

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* Reg. $69.95 (See 9/86 review)

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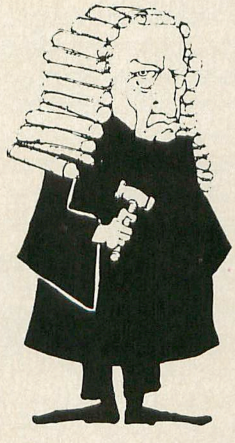

'Here comes the ...

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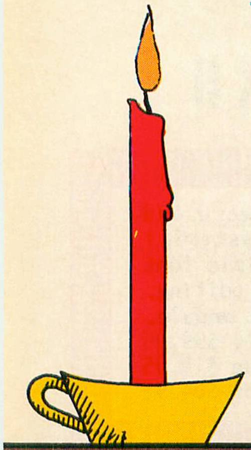
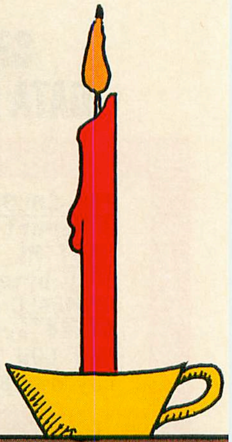
32K
ECB

CoCo nuts roasting near an open fire

Holiday Hearth



'Twas a few days before Christmas and all through the den
Not a key was in motion — a lack of ideas again.
When what to my wondering eyes should appear
But a pint-sized computer and a program, oh dear!
Through the pages and pages of numbers I race
And . . . thank you, dear Rainbow . . . a Christmas Fireplace!



By Eugene Vasconi

Christmas Fireplace is a warm addition to your holiday cheer and uses a graphics technique put forth by John Fraysse in the October 1983 RAINBOW [Page 18]. Part one of the program creates the basic graphics scene while part two holds the animation loop of four fires, light patterns and the music.

You will need to create two separate programs, then load the first one and run it. Without losing memory, load the second program and run it. (The CoCo will retain anything created on the graphics pages even when a new program is loaded.)

The part of the program that was most fun was keeping the music going while the fireplace roars along. I accomplished this by using data statements and a `PLAY` command that inserted one note of the song between every flip of the pages. With the proper delay, it sounds like a continuous tune.

Stoke up your CoCo, nestle up to the TV and stay warm over the holidays!

(Questions about this program may be directed to the author at 12474 Starcrest #204, San Antonio, TX 78216, 512-496-5783. Please enclose an SASE when writing.) ☐

Eugene Vasconi is a commercial helicopter pilot in San Antonio, Texas. His computer interests include graphics, music and education. He has been a CoCoer for five years.

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CoCo III Service Manual	$39.95
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```
24 .......131
48 .......112
72 .......248
END .....101
```

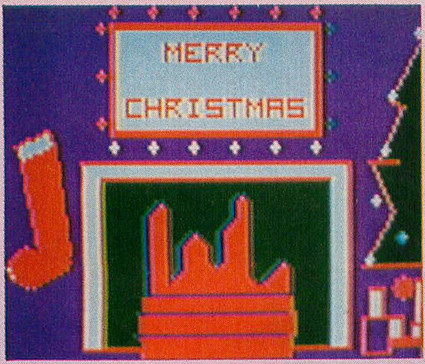
Listing 1: XMASFIRE

```
1 CLS(4):PRINT@98,"THIS IS THE F
IRST PART OF THIS  PROGRAM. IT I
S CREATING THE     GRAPHICS FOR
PART TWO.  WHEN    YOU GET THE <
OK> PROMPT, JUST   CLOAD THE SEC
OND PROGRAM OVER   THIS ONE. ";
2 PMODE1,1:PCLS:GOTO98
3 LINE(48,180)-(208,80),PSET,B
4 LINE(60,180)-(196,88),PSET,B
5 LINE(84,184)-(172,172),PSET,BF
6 LINE(86,172)-(174,160),PSET,BF
7 LINE(84,162)-(172,152),PSET,BF
8 LINE(82,174)-(86,162),PSET,BF
9 LINE(66,66)-(190,10),PSET,B
10 LINE(68,64)-(188,12),PSET,B
11 DRAW"BM84,56;L8U8R8"
12 DRAW"BM88,56;U8D4R8D4U8"
13 DRAW"BM100,56;U8R8G4L4R4F4"
14 DRAW"BM124,28;U8R8G4L4R4F4"
15 DRAW"BM136,28;U8R8G4L4R4F4"
16 DRAW"BM114,56;R4L2U8L2R4"
17 DRAW"BM124,56;R8U4L8U4R8"
18 DRAW"BM172,56;R8U4L8U4R8"
19 DRAW"BM140,56;U8L4R8"
20 DRAW"BM148,56;U8F4E4D8"
21 DRAW"BM160,56;U8R8D4L8R8D4"
22 DRAW"BM100,28;U8F4E4D8"
23 DRAW"BM120,28;L8U4R4L4U4R8"
24 DRAW"BM148,20;F4D4U4E4"
25 LINE(256,15)-(232,48),PSET
26 LINE-(240,52),PSET
27 LINE-(226,80),PSET
28 LINE-(236,80),PSET
29 LINE-(220,80),PSET
30 LINE-(234,106),PSET
31 LINE-(216,136),PSET
32 LINE-(252,136),PSET
33 LINE-(252,196),PSET
34 REM PRESENTS
35 LINE(252,144)-(248,168),PSET,
B
36 LINE(252,168)-(246,176),PSET,
B
37 LINE(240,176)-(232,164),PSET,
B
38 LINE(252,180)-(232,176),PSET,
BF
39 LINE(232,184)-(216,164),PSET,
B
40 LINE(228,164)-(220,148),PSET,
B
41 CIRCLE(240,148),6
42 LINE(8,72)-(12,80),PSET
43 LINE-(32,72),PSET
44 LINE-(28,64),PSET
45 LINE-(8,72),PSET
46 LINE(12,80)-(22,128),PSET
47 LINE(32,72)-(40,128),PSET
48 CIRCLE(14,134),10,,1,.4,.9
49 CIRCLE(8,132),5,,1,.5,.9
50 LINE(2,136)-(6,142),PSET
51 CIRCLE(14,138),8,,1,.2,.4
52 LINE(18,146)-(38,136),PSET
53 CIRCLE(34,132),6,,1,.8,.25
54 PAINT(12,4),3,4
55 PAINT(28,108),4,4
56 PAINT(250,88),2,4
57 PAINT(240,148),4,4
58 PAINT(228,172),3,4
59 PAINT(108,104),2,4
60 DRAW"BM82,172;C3;R88"
61 DRAW"BM84,160;C3;R86"
62 CIRCLE(250,15),3,5:CIRCLE(235
,46),3,5:CIRCLE(230,75),3,5
63 CIRCLE(225,100),3,5:CIRCLE(22
0,133),3,5:CIRCLE(240,120),3,5
64 FORX=3TO7STEP2
65 Y=X+1
66 PCOPY 1TO X:PCOPY 2TO Y
67 NEXTX
68 PMODE1,1
69 FOR X=68TO188 STEP24
70 CIRCLE(X,4),2,4
71 CIRCLE(X,72),2,5
72 NEXTX
73 FORX=12TO68STEP24
74 CIRCLE(60,X),2,4
75 CIRCLE(196,X),2,2
76 NEXTX
77 PMODE1,3
78 FORX=76TO188STEP24
79 CIRCLE(X,4),2,5
80 CIRCLE(X,72),2,4
81 NEXTX
82 FOR X=20TO68STEP24
83 CIRCLE(60,X),2,2
84 CIRCLE(196,X),2,4
85 NEXTX
86 PMODE1,5
87 FORX=84TO188STEP24
88 CIRCLE(X,4),2,2
89 CIRCLE(X,72),2,5
90 NEXTX
91 FORX=28TO68STEP24
92 CIRCLE(60,X),2,2
93 CIRCLE(196,X),2,1
94 NEXTX
95 PMODE1,7
96 PCOPY 3 TO 7:PCOPY 4 TO 8
97 END
98 PCLEAR8:GOTO3
```

```
14 ........28
33 ........241
END ......19
```

Listing 2: XMASDRVR

```
1 CLS(8):PRINT@97,"NOW IMAGINE I
T'S CHRISTMAS EVE   AND OUTSIDE T
HE SNOW IS GENTLY   FALLING. YOU'
RE WARM AND COZY    IN YOUR LIVIN
G ROOM WAITING      FOR SANTA TO
BRING THAT NEW      DISC DRIVE AN
D PRINTER! ";
2 PRINT@391,"MERRY CHRISTMAS ";
3 FOR M=1TO5000:NEXTM
4 PMODE1,1:CLEAR200
5 DRAW"BM88,150;C3;U42E8F4D40E8U
12E8F8D8F4E4U16E8U8E4F4D40F4R4E1
2F4D14L84"
6 PAINT(90,145),4,3
7 PMODE1,3
8 DRAW"BM88,150;C3;E16U26E4U10E4
D52R8U4E4U8E8F4D24E8F8D4R8U16E4F
4D16L80"
```



```
9 PAINT(93,148),4,3
10 PAINT(163,148),4,3
11 PMODE1,5
12 DRAW"BM88,150;C3;H4E8U8F4D12R
12U48E8F4D36G4D8F4R12E8U4E4U4F4D
8F4U48F4D8F4D28E8D20L84"
13 PAINT(90,148),4,3
14 PMODE1,7
15 DRAW"BM88,150;C3;U24F4D12E8D1
2R12U8E4U44F4D16F4D28F4R16U8E4U4
0F4D48R8E8F4D8L84"
16 PAINT(90,148),4,3
17 DIMA$(64),B$(11)
18 FOR A=1TO64
19 READ A$(A)
20 NEXTA
21 FOR B=1TO11
22 READ B$(B)
23 NEXTB
24 Y=0:Z=0:ZZ=0:QQ=0:XX=0
25 FOR X=1TO8STEP2
26 SCREEN1,1
27 PMODE1,X
28 IF XX=11 THEN GOTO35
29 Y=Y+1:Z=Z+1
30 IF Z>110 THEN GOTO34
31 PLAY"L10;XA$(Y);"
32 IF Y=64 THEN Y=0
33 GOTO 36
34 XX=XX+1:PLAY"L10;XB$(XX);":GO
TO36
35 FOR PP=1TO30:QQ=QQ+1:NEXTPP
36 NEXTX
37 IF QQ>2000 THEN GOTO24
38 GOTO25
39 DATA L60;O4CEGO5C,P10,O4;L60;
CEGO5C,P10,O4;B,A,G,F,E,E,E,P10,
P10,P10,P10,P10,L40;CEGO5C,P10,O
4;L40;DFA,P10,G,F,E,D,C,P10,O5;A
,P10,G,P10,E,P10
40 DATA L60;O4;CEGO5C,P10,O4C,P1
0,L60;DFA,P10,C,D,L60;EGB,P10,G,
A,B,P10,P10,A,L60;CE-A-,P10,A-,P
10,B-,A-,G,F,L60;CEG,P10,L60;CEG
,P10,G,F,E,D
41 DATA L60;O4;CEGO5C,O4A,G,P10,
L60;CEGO5C,P10,P10,P10,O4D,P10,L
40;O3CEGO4CEGO5C
```

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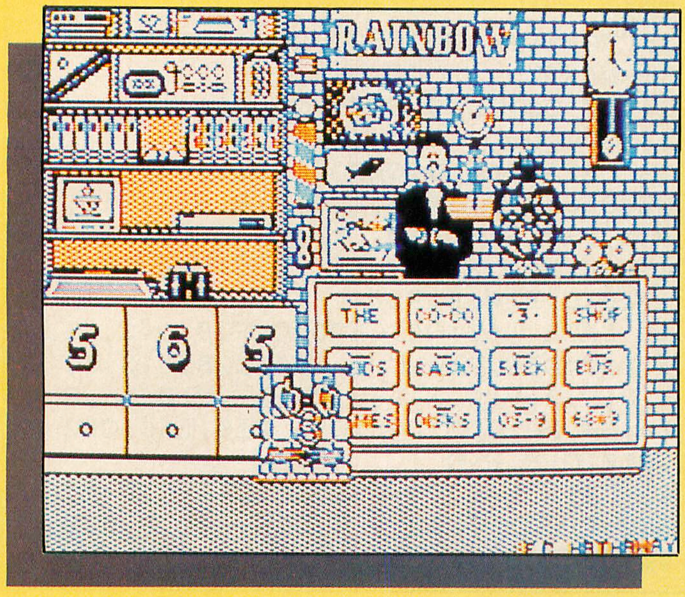
The CoCo Gallery



1st PRIZE

Strictly CoCo

Edwin Hathaway

Glendale Heights, IL

Edwin takes top honors this month with his impression of what a country store filled with CoCo accessories could look like here in Prospect, Kentucky. It took approximately 15 hours to create this pictorial with *CoCo Max*, and Edwin feels this one is his best, so far.

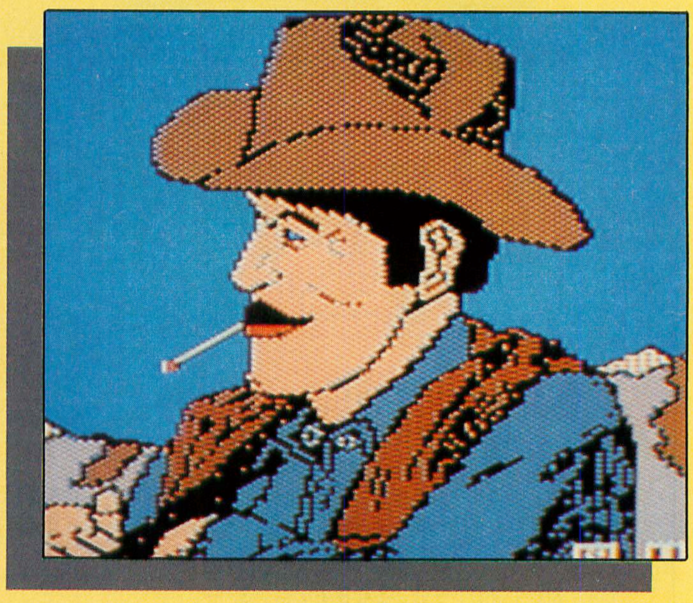
2nd PRIZE

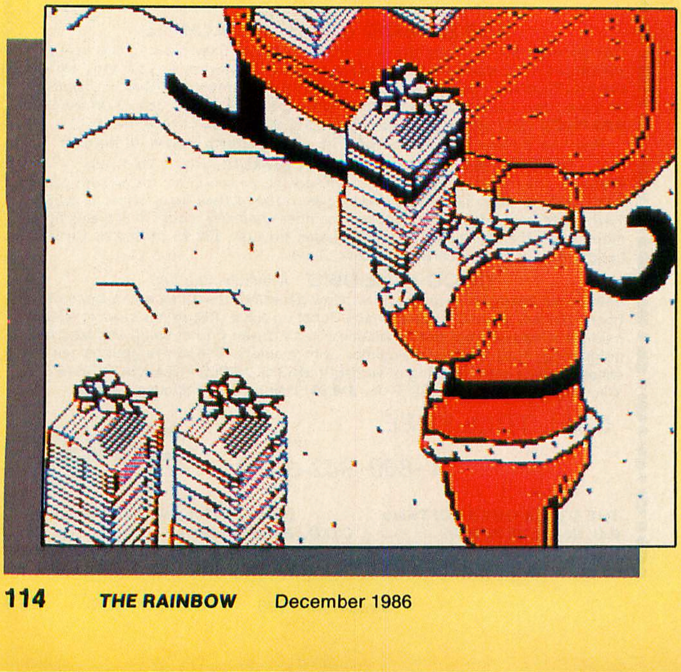
Cowboy

Kevin S. Jessup

Lawrence, IN

Kevin has had his Color Computer since 1982, and uses it mainly for applications. He is the president of the Indy Color Computer Club, is married and has two children. Kevin used *McPaint*, along with *Pixel-Paint* and *Graphicom Part II*, to help create this western image.





3rd PRIZE

X-Mas

George Aloia

Margate, FL

"Ho, ho, ho, and a Merry Christmas" is the message from George. George is the president of Broward County Color Computer Club and created this holiday scenery with *CoCo Max*, just in time for our December issue.

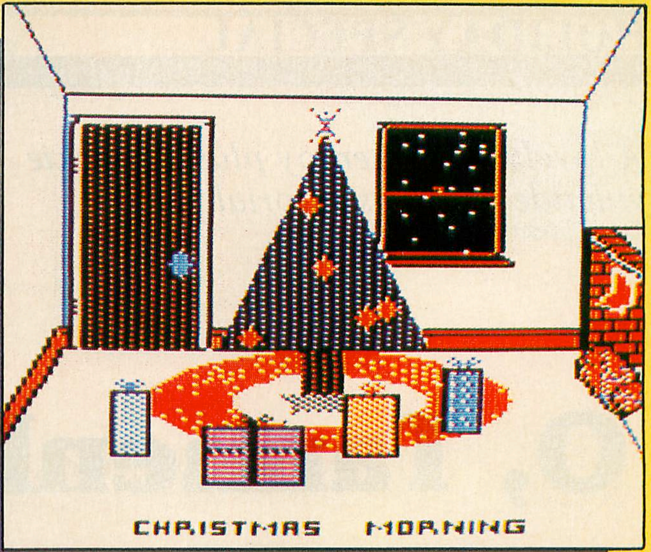
Christmas Morning

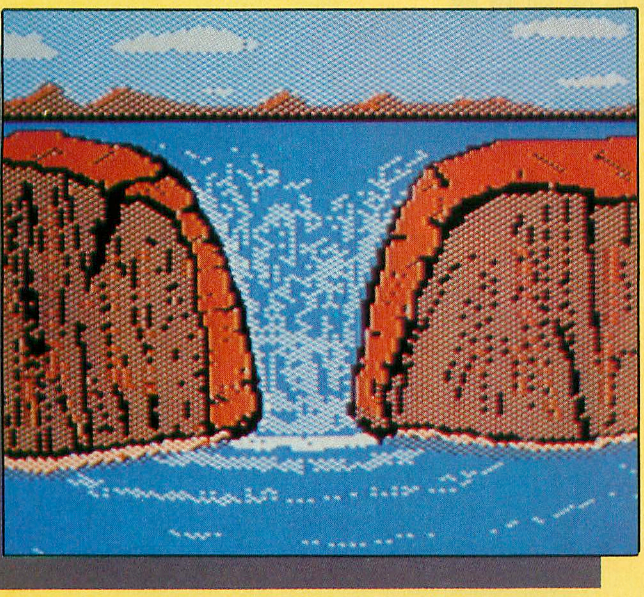
Ryan Devlin

Louisville, KY

HONORABLE MENTION

This pictorial comes from right here in Kentucky, just a stone's throw away from RAINBOW headquarters. Ryan is 14 years old and enjoys the theater and computers. *Christmas Morning* was created with BASIC and, as you can tell, Ryan is already thinking about the holiday season.





Waterfall

Ken Miller

Yardley, PA

HONORABLE MENTION

Reminding us (or some of us), about the wonderful vacation spent on a tropical island, is this beautiful waterfall which was created with *CoCo Max*. Ken is a Senior at Pennsbury High School and is planning to go to college to major in computer science.

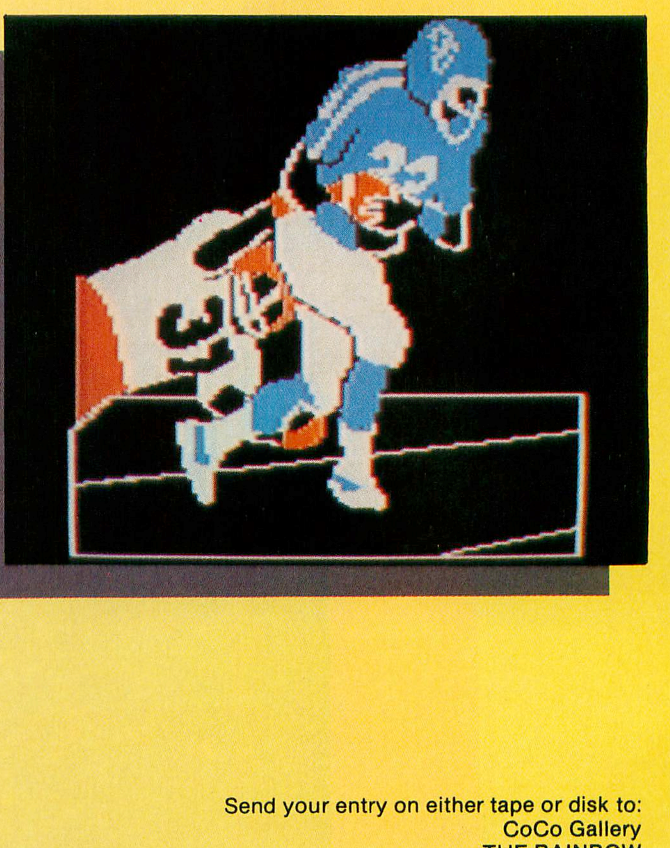
Football

Steven E. Baker

Hattiesburg, MS

HONORABLE MENTION

With the football season now upon us, Steven used BASIC to grace the gallery with these two football players in motion. Steven is the president of a small vertical-market software development company and has had his CoCo for three years.



SHOWCASE YOUR BEST!

You are invited to nominate original work for inclusion in upcoming showings of "CoCo Gallery." Share your creations with the CoCo Community!

Be sure to send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.) and how to display it. Also, *please* include several facts about yourself, the more the better.

Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere. A digitized copy of a picture that appears in a book or magazine is *not* an original work.

We will award a first prize of $25, a second prize of $15 and a third prize of $10. Honorable mentions will also be given.

Jody Doyle, Curator

Send your entry on either tape or disk to:
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THE RAINBOW
P.O. Box 385
Prospect, KY 40059
Attn: Jody Doyle

16K
ECB

A lovely tree to enjoy plus a quickie yuletide graphics tutorial

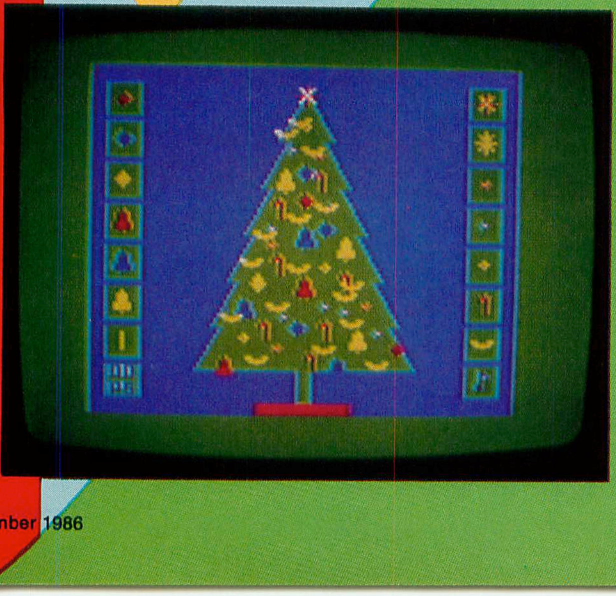
O, Tannenbaum

By Becky F. Matthews

At last, a Christmas tree Simulation! Your CoCo supplies the tree and lots of ornaments including balls, bells, stars, lights, icicles, candy canes and tinsel. The ornament icons are arranged on either side of the graphics screen. The Christmas tree is in the center of the screen. Use the right joystick to select and place ornaments on the tree using the point-and-click method. First, point the joystick so the cursor is positioned over the ornament icon wanted. Then click the joystick button to select that ornament. Now point the joystick to position the cursor where you would like to have the ornament, and click the button to put it there.

There are two special icons that do not represent ornaments, the Oops icon and the Musical Note icon. Clicking on the Oops icon removes the last ornament placed. Clicking on the Musical Note icon plays a Christmas tune. To trim your tree, load `TRIMTREE` and run. To save your decorated tree to tape, press the S key. To load a previously saved tree, press the L key.

There are several examples in this listing of using a `FOR-NEXT` loop to simplify graphics programming. Lines 130 to 150 draw three small Christmas



Becky Matthews has a degree in music education from the University of Mississippi. She and her husband David have three CoCos and two CoCo cats.

trees on the title page. Originally, there was only one small tree drawn with A equal to 175. With the addition of a FOR-NEXT loop, one tree was easily changed into three trees. The loop first sets A to 165 where the first small tree is drawn. The next time the loop is executed, A is 175 and the second tree is drawn 10 spaces (STEP 10) to the right of the first tree. The third and final time through the FOR-NEXT loop, A is equal to 185, the position of the third small tree. The same method is utilized in lines 260 and 270 where the three small trees are colored with random graphics characters.

The title page is drawn on the text screen. On this screen there are 32 horizontal screen locations. Therefore, to draw a straight vertical line, a FOR-NEXT loop with STEP 32 is used. In lines 290 and 300 this is done to make colorful word borders. To see how much these two lines add to the attraction of the title page, press BREAK, type EDIT 290, press ENTER, type I ' (apostrophe) and press ENTER (to end the editing). Edit Line 300 in the same way, then run the program and see the difference in the title page. To return these lines to their original state, press BREAK, type EDIT 290, press ENTER, then press the D key once (to delete one character, the apostrophe), then press ENTER. Edit Line 300 the same way.

In programming graphics, look for a repetitive pattern as a possible place to use a FOR-NEXT loop. We have seen examples of this with the three small trees and the word borders. Another example is the outline of the large Christmas tree (Line 570). To draw the right side of the tree starting at the top, first a line is drawn toward the lower-right screen corner, then a line is drawn to the left. Looking at the large tree, you can see that this pattern is repeated six times. Instead of typing 12 different LINE statements, a FOR-NEXT loop is used. Each time through, X is incremented by 10 and Y is incremented by 25. The left side of the tree is drawn the same way (lines 640 to 670), except X is decremented by 10 each time.

Another example of a repetitive graphics pattern begins with Line 730. There are 16 green ornament boxes drawn in two vertical rows, one row on each side of the screen. Line 740 sets the horizontal position for the first row of boxes (X=8) and the second row (X=227). Line 750 increments the vertical position Y by 22 each time the loop is executed to position eight boxes in each row. To make a screen full of green boxes type EDIT 740, press ENTER, type X (to extend the line or to get to the end of it quickly), press the left arrow twice (to erase the 1 and the 9), type 4 and press ENTER. The end of Line 740 should now read STEP 24. Now type RUN and after the title screen there will be 100 green boxes instead of 16! To change Line 740 back to normal, press BREAK, type EDIT 740, press ENTER, type X, press the left arrow once (to erase the 4), type 19 and press ENTER. The end of Line 740 should read STEP 219. Try experimenting with FOR-NEXT loops next time you program graphics.

(Questions about this program may be directed to the author at P.O. Box 339, Antioch, TN 37013-0339. Please enclose an SASE for a reply.) ☐

200	23	1180	235
370	97	1390	38
570	91	1640	76
770	121	END	26
980	53		

The listing: TRIMTREE

```
10 '****TRIMTREE****
20 '****BY BECKY MATTHEWS****
30 '*TITLE AND INSTRUCTIONS
40 DIMZ(10)
50 CLS4
60 PRINT@43,"TRIM  THE";:PRINT@7
5,"CHRISTMAS";:PRINT@107,"  TREE
! ";
70 PRINT@323,"POINT AND CLICK WI
TH YOUR";
80 PRINT@355,"RIGHT JOYSTICK TO
CHOOSE ";
90 PRINT@387,"AN ORNAMENT, THEN
POINT  ";
100 PRINT@419,"AND CLICK AGAIN T
O PLACE ";
110 PRINT@451,"IT ON THE CHRISTM
AS TREE.";
120 '*DRAW LITTLE TREES
130 FOR A = 165 TO 185 STEP 10
140 PRINT@A," ";:PRINT@A+31,"   
";:PRINT@A+62,"     ";:PRINT@A+9
6," ";
150 NEXT A
160 '*GOSUB PLAY TUNE
170 GOSUB1640
180 PRINT@483,"PRESS ANY KEY WHE
N READY.";
190 '*WAIT LOOP
200 '*JINGLE BELLS SOUND EFFECT
210 SOUND 255,1:SOUND 254,1
220 '*LITTLE TREES
230 T1 = RND(112)+143:T2=RND(112
)+143:T3=RND(112)+143:T4=RND(112
)+143
240 T$=CHR$(T1)+CHR$(T2)+CHR$(T3
)+CHR$(T4)+CHR$(T1)
250 '*COLOR LITTLE TREES
260 FOR A = 165 TO 185 STEP 10:P
RINT@A,CHR$(T1);:PRINT@A+31,CHR$
(T2)+CHR$(T3)+CHR$(T4);:PRINT@A+
62,T$;:PRINT@A+96,CHR$(T2);
270 NEXT A
280 '*COLOR WORD BORDERS
290 FOR Y = 42 TO 106 STEP 32:PR
INT@Y,CHR$(T1);:PRINT@Y+10,CHR$(
T1);:NEXTY
300 FOR Y = 322 TO 482 STEP 32:P
RINT@Y,CHR$(T1);:PRINT@Y+26,CHR$
(T1);:NEXTY
310 A$=INKEY$:IF A$="" THEN 200
320 '*GOSUB DRAW TREE
330 GOSUB570
340 '*GOSUB DRAW ORNAMENTS
350 GOSUB730
360 X=18:Y=18:GOSUB790:Y=40:GOSU
```

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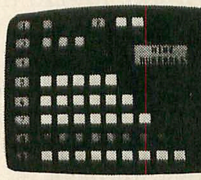

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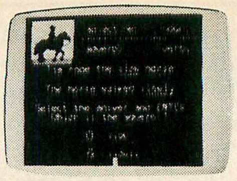

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MS 5 — Suffixes: paid, quickly, extremely
MS 6 — Suffixes: said, confusion, school's
MS 7 — Homonyms: two, too, to; their, there
MS 8 — Homonyms: our, are, hour; ate, eight

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```
B820:Y=62:GOSUB850:Y=82:GOSUB880
:Y=104:GOSUB920
370 Y=126:GOSUB960:Y=146:GOSUB10
00:X=12:Y=164:GOSUB1030
380 X=236:Y=18:GOSUB1060:Y=40:GO
SUB1090:Y=62:GOSUB1120
390 Y=84:GOSUB1150:Y=106:GOSUB11
80:Y=126:GOSUB1210
400 Y=150:GOSUB1240:GOSUB 1270
410 '*GOSUB JOYSTICK ROUTINE
420 GOSUB 1760
430 '*CLICK ROUTINE
440 IF X < 8 OR X > 248 THEN 410
450 IF Y < 10 OR Y > 182 THEN 41
0
460 IF X >28 THEN 1300
470 IF Y > 9 AND Y < 27 THEN D =
 1
480 IF Y > 31 AND Y < 49 THEN D
= 2
490 IF Y > 53 AND Y < 71 THEN D
= 3
500 IF Y > 75 AND Y < 93 THEN D
= 4
510 IF Y > 97 AND Y < 115 THEN D
 = 5
520 IF Y > 119 AND Y < 137 THEN
D = 6
530 IF Y > 141 AND Y < 159 THEN
D = 7
540 IF Y > 163 AND Y < 181 THEN
1700
550 SOUND 200,1
560 GOTO 1400
570 '*TREE SUB
580 PMODE3,1:PCLS3:SCREEN1,0
590 COLOR1,4
600 Y=15:FOR X = 128 TO 180 STEP
 10
610 LINE(X,Y)-(X+16,Y+25),PSET:L
INE-(X+10,Y+25),PSET
620 Y=Y+25
630 NEXT X
640 Y=15:FOR X = 128 TO 72 STEP
-10
650 LINE(X,Y)-(X-16,Y+25),PSET:L
INE-(X-10,Y+25),PSET
660 Y=Y+25
670 NEXT X
680 LINE(68,165)-(190,165),PSET
690 PAINT(118,50),1,1
700 LINE(124,165)-(132,185),PSET
,BF
710 LINE(100,185)-(156,191),PRES
ET,BF
720 RETURN
730 '*ORNAMENTS BOXES SUB
740 COLOR 1:FOR X = 8 TO 227 STE
```

```
P219
750 FOR Y = 9 TO 182 STEP 22
760 LINE(X,Y)-(X+20,Y+18),PSET,B
F
770 NEXT Y:NEXT X
780 RETURN
790 '*RED BALL SUB
800 CIRCLE(X,Y),5,4:PAINT(X,Y),4
,4
810 RETURN
820 '*BLUE BALL SUB
830 CIRCLE(X,Y),5,3:PAINT(X,Y),3
,3
840 RETURN
850 '*YELLOW BALL SUB
860 CIRCLE(X,Y),5,2:PAINT(X,Y),2
,2
870 RETURN
880 '*RED BELL SUB
890 COLOR4:CIRCLE(X,Y),5,4,1,.52
,.99:LINE(X-2,Y)-(X-4,Y+6),PSET:
LINE-(X+4,Y+6),PSET:LINE-(X+2,Y)
,PSET
900 PAINT(X,Y),4,4:PSET(X,Y+8,4)
910 RETURN
920 '*BLUE BELL SUB
930 COLOR3:CIRCLE(X,Y),5,3,1,.52
,.99:LINE(X-2,Y)-(X-4,Y+6),PSET:
LINE-(X+4,Y+6),PSET:LINE-(X+2,Y)
,PSET
940 PAINT(X,Y),3,3:PSET(X,Y+8,3)
950 RETURN
960 '*YELLOW BELL SUB
970 COLOR2:CIRCLE(X,Y),5,2,1,.52
,.99:LINE(X-2,Y)-(X-4,Y+6),PSET:
LINE-(X+4,Y+6),PSET:LINE-(X+2,Y)
,PSET
980 PAINT(X,Y),2,2:PSET(X,Y+8,2)
990 RETURN
1000 '*ICICLE SUB
1010 COLOR2:LINE(X,Y-1)-(X,Y+9),
PSET
1020 RETURN
1030 '*OOPS SUB
1040 N$="BM"+STR$(X)+","+STR$(Y)
:DRAW"C3;XN$;D6R4U6NL4BR4D6R4U6N
L4BD10L4D3R4D3L4BL8U6R4D4L4"
1050 RETURN
1060 '*RED AND YELLOW STAR SUB
1070 N$="BM"+STR$(X)+","+STR$(Y)
:DRAW"C4;XN$;NU6ND6NL6NR6C2NE4NF
4NG4NH4"
1080 RETURN
1090 '*YELLOW STAR SUB
1100 N$="BM"+STR$(X)+","+STR$(Y)
:DRAW"C2;XN$;NU6ND6NL6NR6NE4NF4N
G4NH4"
1110 RETURN
```

```
1120 '*RED LIGHT SUB
1130 CIRCLE(X,Y),3,4:PSET(X,Y,2)
1140 RETURN
1150 '*BLUE LIGHT SUB
1160 CIRCLE(X,Y),3,3:PSET(X,Y,2)
1170 RETURN
1180 '*YELLOW LIGHT SUB
1190 CIRCLE(X,Y),3,2:PSET(X,Y,4)
1200 RETURN
1210 '*CANDY CANE SUB
1220 COLOR4:CIRCLE(X,Y),5,4,1,.5
2,.99:LINE(X+2,Y)-(X+2,Y+7),PSET
1230 RETURN
1240 '*YELLOW TINSEL SUB
1250 FORT=0TO1:CIRCLE(X,Y-T),6,2
,.5,0,.5:NEXTT
1260 RETURN
1270 '*MUSIC NOTE SUB
1280 DRAW"BM236,176C3L2U2R2D2U10
F4"
1290 RETURN
1300 '*CLICK CHECK 2
1310 IF X < 226 THEN 1400
1320 IF Y > 9 AND Y < 27 THEN D
= 9
1330 IF Y > 31 AND Y < 49 THEN D
 = 10
1340 IF Y > 53 AND Y < 71 THEN D
 = 11
1350 IF Y > 75 AND Y < 93 THEN D
 = 12
1360 IF Y > 97 AND Y < 115 THEN
D = 13
1370 IF Y > 119 AND Y < 137 THEN
 D = 14
1380 IF Y > 141 AND Y < 159 THEN
 D = 15
1390 IF Y > 163 AND Y < 181 THEN
 GOSUB 1640 ELSE SOUND 200,1
1400 '*CLICK TO PLACE
1410 '*GOSUB JOYSTICK ROUTINE
1420 GOSUB 1760
1430 IF X < 48 THEN 430
1440 IF Y < 10 OR Y > 182 THEN 4
10
1450 IF X > 210 OR D = 0 THEN 41
0
1460 SOUND 250,1
1470 X2=X:Y2=Y:GET(X2-10,Y2-9)-(
X2+10,Y2+9),Z,G
1480 IF D = 1 THEN GOSUB 790
1490 IF D = 2 THEN GOSUB 820
1500 IF D = 3 THEN GOSUB 850
1510 IF D = 4 THEN GOSUB 880
1520 IF D = 5 THEN GOSUB 920
1530 IF D = 6 THEN GOSUB 960
1540 IF D = 7 THEN GOSUB 1000
1550 IF D = 8 THEN GOSUB 1030
1560 IF D = 9 THEN GOSUB 1060
1570 IF D = 10 THEN GOSUB 1090
1580 IF D = 11 THEN GOSUB 1120
1590 IF D = 12 THEN GOSUB 1150
1600 IF D = 13 THEN GOSUB 1180
1610 IF D = 14 THEN GOSUB 1210
1620 IF D = 15 THEN GOSUB 1240
1630 GOTO410
1640 '*PLAY TUNE SUB
1650 PLAY"V31L1T50O4CL8FP1FP1FP1
L1O1FP1P1P1"
1660 PLAY"L1O4GL8AP1AP1AP1L1O1AP
1P1P1"
1670 PLAY"O4L1AL8GP1AP1B-P1L1O2C
P1P1"
1680 PLAY"O4T25L1EGL2FP1O1F"
1690 RETURN
1700 '*OOPS SUB
1710 IF X2=0 AND Y2=0 THEN 410
1720 PUT(X2-10,Y2-9)-(X2+10,Y2+9
),Z,PSET
1730 PLAY"V30T155O2BAGFEDCO1BAGF
EDC"
1740 X2=0:Y2=0
1750 GOTO410
1760 '*JOYSTICK CURSOR AND CLICK
 SUB
1770 A=JOYSTK(0):B=JOYSTK(1)
1780 X=A*4:Y=B*3:L=PPOINT(X,Y):R
=PPOINT(X+2,Y)
1790 S=L+3:PSET(X,Y,S):PSET(X+2,
Y,S):PSET(X,Y,L):PSET(X+2,Y,R)
1800 B$=INKEY$:IF B$="S" THEN 18
40
1810 IF B$="L" THEN 1910
1820 P=PEEK(65280):IFP<>254ANDP<
>126THEN1770
1830 RETURN
1840 '*CSAVE SUB
1850 CLS:PRINT"SAVE TREE":PRINT:
PRINT
1860 INPUT"ENTER NAME FOR TREE";
A$:PRINT:PRINT"PRESS A KEY WHEN
CASSETTE READY."
1870 B$=INKEY$:IF B$="" THEN 187
0
1880 CLS3:PRINT "SAVING "A$;
1890 CSAVEM A$,&H600,&H1DFF,0
1900 PMODE3,1:SCREEN1,0:GOTO410
1910 '*CLOAD SUB
1920 CLS:PRINT"LOAD TREE":PRINT:
PRINT
1930 PRINT"PRESS A KEY WHEN CASS
ETTE READY."
1940 B$=INKEY$:IF B$="" THEN 194
0
1950 PMODE3,1:SCREEN1,0:CLOADM:G
OTO410
```

Mind-tingling action!

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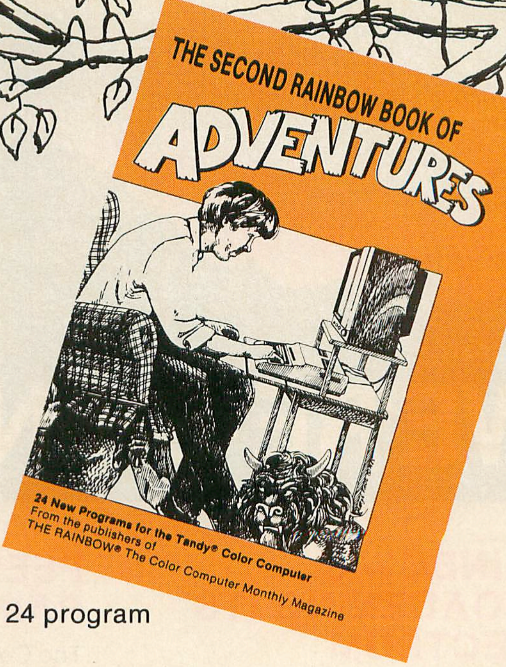

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WE'RE BRINGING THE COCO

RAINBOW'S BROADENING ITS SPECTRUM

THE RAINBOW and the Delphi Information Utility have joined together to allow CoCo owners all over the world to connect with one another!

Delphi is a full-service information utility. It offers everything from up-to-the-minute news stories from The Associated Press to electronic mail services. But, *best of all*, it now has **a special forum for Color Computer owners, and it's operated by the people who bring you THE RAINBOW each month.**

The CoCo Special Interest Group (SIG) features a variety of services, including an open forum where you can send and receive messages from Color Computer owners all over the world. It also has several databases to which you can upload your favorite programs and from which you can download programs written by other CoCo enthusiasts. Some of these databases are BASIC programming, OS-9 and home applications.

When setting up your account with Delphi, if you do not have a credit card or prefer not to use it, Delphi requires that you send $20 to give your account a positive balance. This will be refunded after your first free hour if you choose to no longer use the system or it will be applied to future connect charges. If you do not maintain a positive balance, you will be charged $3.50 each month for direct billing.

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The CoCo SIG's conference feature allows you to meet electronically with other members of the CoCo Community. You can join conferences with notables such as Dale Puckett, Cray Augsburg, Marty Goodman, Don Hutchison, Jim Reed, Lonnie Falk and others — on a regular basis. Conference schedules will appear in THE RAINBOW each month. Be sure to check online announcements for changes and additions.

THE OTHER SIDE OF THE RAINBOW

On Delphi, you also are able to buy RAINBOW ON TAPE — order a whole set, or download an individual program immediately. You can also renew your RAINBOW subscription, make a fast and easy order for software or hardware from a multitude of vendors, or inquire about products on the CoCo SIG.

We also have a number of **programs that you can download** and use, just for the cost of the time you spend transferring them. There'll also be **corrections for RAINBOW articles**, helpful hints and many other useful features.

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THE RAINBOW is offering subscribers a free lifetime subscription to Delphi — a $24.95 value — and a free hour of connect time — a $7.20 value at either 300, 1200 or 2400 Baud — so you can sample Delphi and the RAINBOW CoCo SIG. That's right. Your subscription to THE RAINBOW entitles you to this $32.15 value as a ***free bonus!***

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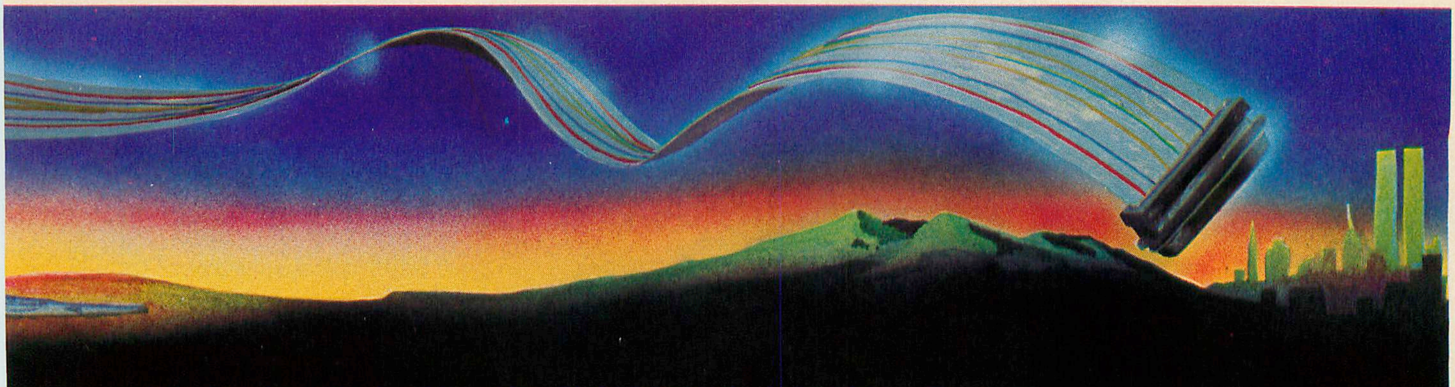


COMMUNITY TOGETHER

How to reach RAINBOW's Color Computer SIG . . .

There are several ways to connect to Delphi and THE RAINBOW's CoCo SIG. In most cities you will not even have to pay long distance charges; you can use special data communications networks like Telenet, Tymnet and the Canadian Datapac network.

First, set your terminal program to operate at either 300 or 1200 Baud (depending on the modem you have), and also select either 7 bits with even parity or 8 bits with no parity, and one stop bit. (If one combination doesn't work, try another.)

Decide which network you should use. There is no surcharge for Telenet or Tymnet. Canadian residents using Datapac will be charged an additional $12 (U.S.) per hour.

On Telenet: The Uninet network has now merged with Telenet. To get the Telenet number for your area, call (800) 336-0437. After you call your local access number and make connection, press the ENTER key twice. When the "TERMINAL=" prompt appears, press ENTER again. When the "@" prompt appears, type `C DELPHI` and press ENTER.

On Tymnet: Call (800) 336-0149 to get the Tymnet number for your area. After you dial your designated number and connect, you will see either "garbage" or a message saying "please type your terminal identifier." At this point, even if the screen is garbled, simply press 'A'. When "please log in:" appears, type `DELPHI` and press ENTER.

From Canada (on Datapac): Call Delphi Customer Service at (617) 491-3393 to get the Datapac number for your area. After you connect, press the period key (.) and ENTER (use two periods if you're using 1200 Baud). Type `SET 2:1, 3:126` and press ENTER. Now type `p 1 3106, DELPHI;` and press ENTER. Delphi's new rates indicate an additional $12 hourly surcharge for evening use of Datapac, which means a total of $18 (U.S.) for connect time.

From other countries: Many countries have their own data networks that can connect to either Telenet or Tymnet. Check with the telephone authorities in your country for details on how to sign up for this service. When you have an account set up, you can reach Delphi with a "host code" of 312561703088 through Telenet, or 310600601500 through Tymnet. (You'll have to pay the toll charges for this connection.)

Type in Your Username

If you're already a subscriber to THE RAINBOW, at the "USERNAME:" prompt, type `RAINBOWSUB` and press ENTER. At the "PASSWORD:" prompt, type your individual subscription number from the mailing label of your latest issue of THE RAINBOW. (If there are one or more zeros at the beginning of this number, include them.)

If you don't already have a subscription, at the "USERNAME:" prompt, type `RAINBOWORDER` and press ENTER. At the "PASSWORD:" prompt, type `SENDSUB` and press ENTER. Have your MasterCard, VISA or American Express card ready, because you'll be led through a series of questions that will enable us to put your RAINBOW and Delphi subscriptions into effect. In an effort to hold down non-editorial costs, we do not bill for subscriptions.

If you make a typing error, just press `ENTER` and start over. Remember that at any point, when you're on Delphi, you can type `HELP` to get help on how to use the system. To get off the system just type `BYE`.

If you find that you're unable to log on to Delphi and enter the CoCo SIG after following these instructions, call us during afternoon business hours at (502) 228-4492. We'll be glad to offer assistance.

Come Visit Us! Type: `GROUP COCO`

After you sign in, you'll be prompted to set up your own, personal "user name" — Delphi is a friendly service, no numbers to remember — and you'll be asked a number of questions so Delphi can set up your account. You'll also be assigned a temporary password. No time is assessed against your free hour of service while you answer these questions.

Delphi will tell you that your account will be ready after 6 p.m. the same day if you sign up before noon (Eastern time zone.) If not, your account will be ready at 6 p.m. the next day. Once an account is opened, *each RAINBOW subscriber will be credited with an hour of free time!*

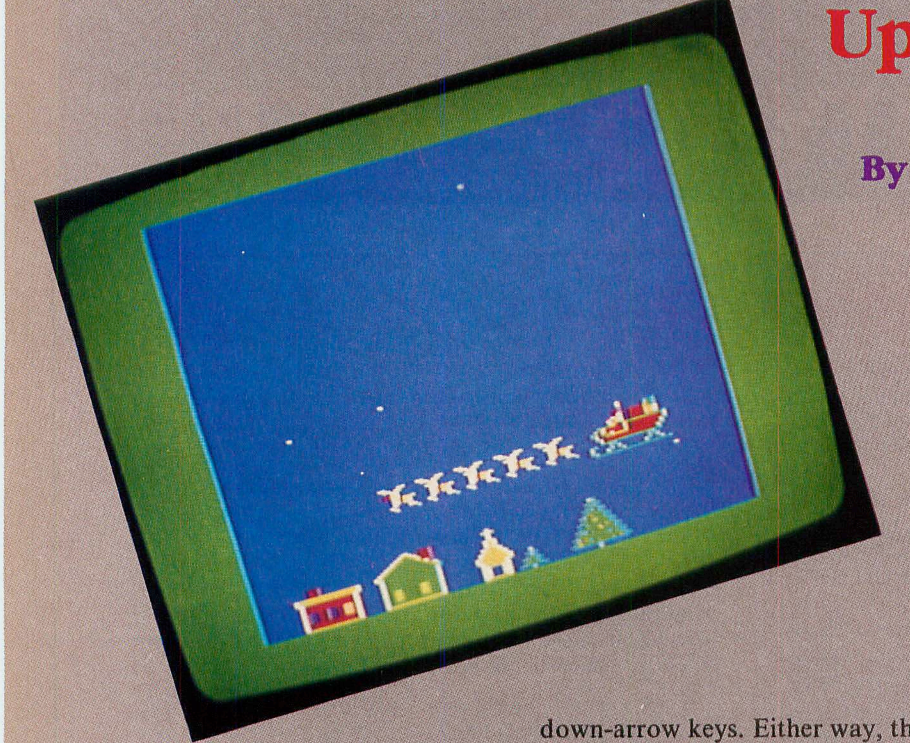
When you log back in, use your chosen username and your temporary password to access the system. At that point, you will meet Max, who will help you configure things and will change your temporary password into your own *personal* password. This is the password you will use for subsequent sessions — or until you change it.

After Max bids you goodbye, you'll wind up at the Delphi Main Menu; type in `GROUP COCO` and **join us on the CoCo SIG!**

Santa needs your help to fly his magical nighttime mission

Up on the Rooftop

By J. D. German



If you're looking for a Christmas present that will get your youngsters interested in the computer, this program may be just what Santa ordered. *Here Comes Santa* is a Christmas graphics game with a built-in, personalized gift tag. Actually, it's not a game in the usual sense, since there is no scoring or clock to play against. But it is fun — so much fun that you may have trouble getting the kids to give up the computer when it's your turn.

Here Comes Santa is a BASIC graphics animation in which your child controls Santa and his reindeer as they fly through a star-filled sky and land in front of houses below. Santa's altitude is controlled either with a joystick or from the keyboard with the up- and down-arrow keys. Either way, the reindeer and sleigh behave according to the laws of physics, having to overcome momentum to change their flight path.

J.D. German works in Albuquerque, N.M., as an analyst for the Strategic Defense Initiative "Star Wars" program. He has written several articles for Color Computer magazines and has authored educational programs for the CoCo.

The overall program structure is designed to keep the graphics animation as fast as possible. The animation routine is located at the front end of the program and time-consuming statements within the animation loop (lines 90 to 450) were kept to a minimum. In spite of this, Santa flew a little slower than I would have liked, so I added the speed-up poke as Line 65. If your computer won't respond to the speed-up poke, you may want to remove one or two of the animated background objects to buy some speed. These objects (houses, trees, etc.) are put in place as arrays B1 through B4 in lines 90, 100, 230 and 240. You can skip the `DRAW` statements (lines 550 to 600) for any deleted objects to save some typing time. Another alternative is to give up the moving star background `PSET` with lines 110 and 250. The lines that generate the stars (lines 660 and 670) and the lines that move the stars (lines 400 through 440) can also be eliminated.

Lines 1, 2 and 63990 are included to work around the infamous `PCLEAR` bug in the older versions of the Extended BASIC ROM. If your computer doesn't suffer from that abominable affliction, you can leave out those three lines.

Lines 10 through 60 display a Christmas greeting and play a few bars of appropriate music. Line 40 produces a red and green personalized gift card that remains on the screen while the program creates the animated objects. Change the names in that line to match your own children's names. To center the new names on the screen, change the value of the `PRINT@` statement in this line. The new value can be calculated by counting the number of letters and spaces in the name, dividing by two, and adding the result to 32.

After the high-speed poke in Line 65, the program skips to the drawing routine beginning with Line 470. This is where all of the animated figures are initially drawn and painted. After each is completed, a `GET` statement stores the figure in memory as an array. I tried to minimize the amount of typing, so I left out the optional semicolons between most of the `DRAW` parameters. I also saved some typing by defining one legless reindeer, `RD$` in Line 490, then adding two different leg positions in Line 500 to provide the galloping animation for the reindeer. The remainder of the `DRAW` statements produce four figures: a house, an apartment, a church with a pine tree beside it and a large, lighted Christmas tree.

Once the figures have been drawn and

stored, the initial positions of the figures and the stars are produced. To keep the program from getting boring, I added some randomizing functions to the position calculations. Lines 610 through 650 randomly select the order of the four figures and add a random component to the spacing between them. Lines 660 and 670 place the stars at random locations in the sky, while Line 680 starts Santa's sleigh and reindeer at a different altitude each time the program is run.

Finally, Line 690 sets the PLAY parameters for the hoofbeat clicks before Line 700 sends the program into the flying routine loop starting at Line 90.

The animation is achieved by paging back and forth between two screens. While one screen is being displayed, the other is having the figures cleared and set to a new position. The two program blocks that perform this function, lines 90 through 220 and lines 230 through 450, are identical except for the locations of the figures, so I'll just describe the first block.

The scene construction begins with placement of the four ground-level background figures (stored in arrays B1 through B4) in lines 90 and 100. Line 110 sets the stars in place, while lines 120 and 130 put Santa's sleigh and reindeer in place. These figures are added last so they will overlay the other figures and appear to be in front of them. As a final touch to the animation, Line 140 adds the click of tiny hoofbeats whenever the reindeer are on the ground.

Once the scene placement is complete, the positions of Santa and the background figures are updated for the following scene. Line 150 begins this process by making the next position of each reindeer equal to the last position of the reindeer in front of it. This gives the team of reindeer an undulating flight path that adds to the realism. The next two lines, 160 and 170, provide the new altitude position for the lead reindeer (Rudolph, of course). Here you have a choice between joystick control or keyboard control. In this listing, Line 160 is preceded by an apostrophe, so it is not seen by the program, and Line 170, the keyboard control line, drives Rudolph up and down in response to the up- and down-arrow keys. If you would rather use the right joystick, delete the apostrophe in Line 160 and delete Line 170. You must also make the same changes in lines 300 and 310.

The second half of lines 160 and 170 contain the trick to making Santa and his reindeer obey the laws of physics. When the up arrow (or up joystick) is held, the reindeer acquire momentum, as variable DV, in the upward direction. To turn them around to the downward direction, you must hold the down-arrow key (or down joystick) long enough to overcome that momentum, since DV will only change by +/-2 with each position update. Line 190 limits DV to a maximum absolute value of 6, and Line 200 adds DV to Rudolph's present position while ensuring that he cannot fly off the screen.

Finally, Line 210 stops the reindeer if they are all on the ground and the down arrow is pressed. To resume flight, just press the up arrow. After Line 220 "turns the page," the entire cycle is repeated with the second set of reindeer hoof positions.

Here Comes Santa began with a comment from my wife, Patty, about how much fun kids could have with a Christmas computer game. If you enjoy writing or tinkering with animated programs, *Here Comes Santa* is a good one to work with. You could make the house or apartment look like your own, add an airplane for Santa to dodge, or put a Christmas star in the sky. Whatever you do with it, I hope your family enjoys this program as much as mine has. As the jolly old elf himself once said, "A merry Christmas to all, and to all a good night!"

(Questions about this program may be directed to the author at P.O. Box 652, Cedar Crest, NM 87008, 505-281-1719. Please enclose an SASE for a reply.) ☐

110 ....**70**
210 ......**230**
340 ......**216**
500 ....**70**
560 ....**46**
610 ....**0**
END **157**

The listing: SANTA

```
1 GOTO 63990
2 GOTO 10
3 CLEAR 500:PCLEAR 8:GOTO 2
5 '*****************************
  *                           *
  *   HERE COMES SANTA CLAUS  *
  *                           *
  *       BY J. D. GERMAN     *
  *                           *
6 '*    CREATIVE              *
  *         TECHNICAL         *
  *           CONSULTANTS     *
  *                           *
  *        P.O. BOX 652       *
  *   CEDAR CREST, NM 87008   *
  *****************************
10 CLS 4:POKE 65494,0
20 PRINT@109,"MERRY";
30 PRINT@171,"CHRISTMAS";
40 PRINT@233,"CHRIS & JAMIE";
50 PLAY"L2T8O3;CAL4GGL2FCAL4GGL2
FCA#L4A#A#L2ALlA#"
60 PRINT@483,"I'M THINKING - PLE
ASE WAIT";
65 POKE 65495,0:'HIGH SPEED POKE
70 GOTO 470
80 '** FLYING ROUTINE **
90 PUT(X1,168)-(X1+34,191),B1,PS
ET:PUT(X2,168)-(X2+34,191),B2,PS
ET
100 PUT(X3,168)-(X3+34,191),B3,P
SET:PUT(X4,168)-(X4+34,191),B4,P
SET
110 PSET(I1,J1,2):PSET(I2,J2,2):
PSET(I3,J3,2):PSET(I4,J4,2):PSET
(I5,J5,2)
120 FORI=1TO5:PUT(55+20*I,Y(I)-1
1)-(73+20*I,Y(I)),RB,PSET:NEXT I
```

```
:PSET(77,Y(1)-8,4):PSET(77,Y(1)-
7,4):PSET(79,Y(1)-8,4):PSET(79,Y
(1)-7,4)
130 PUT(180,Y(6)-19)-(221,Y(6)+2
),SL,PSET:SCREEN1,0
140 IF Y(1)=190 THEN PLAY"A"
150 FORI=1TO5:Y(7-I)=Y(6-I):NEXT
160 'X=JOYSTK(0):Y=JOYSTK(1):DV=
DV+INT((Y-26)/13):'>>>JOYSTICK V
ERSION ONLY<<<
170 IF PEEK(342)=247 THEN DV=DV+
2 ELSE IF PEEK(341)=247 THEN DV=
DV-2:'>>>KEYBOARD VERSION ONLY<<
<
180 POKE342,0:POKE341,0
190 IF DV>6 THEN DV=6 ELSE IF DV
<-6 THEN DV=-6
200 Y(1)=Y(1)+DV:IF Y(1)<20 THEN
 Y(1)=20 ELSE IF Y(1)>190 THEN Y
(1)=190:DV=0
210 IF Y(1)=190 AND Y(6)=190 AND
 PEEK(342)=247 THEN 210
220 PMODE3,5:PCLS3
230 PUT(X1+4,168)-(X1+38,191),B1
,PSET:PUT(X2+4,168)-(X2+38,191),
B2,PSET
240 PUT(X3+4,168)-(X3+38,191),B3
,PSET:PUT(X4+4,168)-(X4+38,191),
B4,PSET
250 PSET(I1+4,J1,2):PSET(I2+4,J2
,2):PSET(I3+4,J3,2):PSET(I4+4,J4
,2):PSET(I5+4,J5,2)
260 FORI=1TO5:PUT(55+20*I,Y(I)-1
1)-(73+20*I,Y(I)),RA,PSET:NEXT I
:PSET(77,Y(1)-8,4):PSET(77,Y(1)-
7,4):PSET(79,Y(1)-8,4):PSET(79,Y
(1)-7)
270 PUT(180,Y(6)-19)-(221,Y(6)+2
),SL,PSET:SCREEN1,0
280 IF Y(1)=190 THEN PLAY"E"
```

One-Liner Contest Winner . . .

This program creates a cash register, which is great for those fall garage sales.

The listing:

```
0 FORX=1TO99999:CLS:PRINT@41,"CA
SH REGISTER":INPUT"PRICE:";P:INP
UT"CASH TENDERED:";CT:PRINT:PRIN
T"YOU GET:":PRINT"    ";CT-P;"$
BACK IN CHANGE":RT=P+RT:INPUTD:I
FD<1THENNEXT X:ELSE PRINT"YOU MO
VED $";RT;" WORTH OF":PRINT"MERC
HANDISE!!"
```

Russ Rosen
Cardiff, CA

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book of Simulations* and its companion *The Rainbow Simulations Tape*.)

```
290 FORI=1TO5:Y(7-I)=Y(6-I):NEXT
300 'X=JOYSTK(0):Y=JOYSTK(1):DV=
DV+INT((Y-26)/13):'>>>JOYSTICK V
ERSION ONLY<<<
310 IF PEEK(342)=247 THEN DV=DV+
2 ELSE IF PEEK(341)=247 THEN DV=
DV-2:'>>>KEYBOARD VERSION ONLY<<
<
320 POKE342,0:POKE341,0
330 IF DV>6 THEN DV=6 ELSE IF DV
<-6 THEN DV=-6
340 Y(1)=Y(1)+DV:IF Y(1)<20 THEN
 Y(1)=20 ELSE IF Y(1)>190 THEN Y
(1)=190:DV=0
350 X1=X1+8:IF X1>217 THEN X1=0
360 X2=X2+8:IF X2>217 THEN X2=0
370 X3=X3+8:IF X3>217 THEN X3=0
380 X4=X4+8:IF X4>217 THEN X4=0
390 X5=X5+12:Y5=Y5+4:IF X5>217 A
ND RND(20)=1 THEN X5=0:Y5=RND(14
0)
400 I1=I1+8:IF I1>255 THEN I1=0
410 I2=I2+8:IF I2>255 THEN I2=0
420 I3=I3+8:IF I3>255 THEN I3=0
430 I4=I4+8:IF I4>255 THEN I4=0
440 I5=I5+8:IF I5>255 THEN I5=0
450 PMODE3,1:PCLS3:GOTO90
460 '** DRAW ROUTINE **
470 PCLEAR8:PMODE3,1:PCLS3
480 DIM RA(5),RB(5),SL(23),XX(10
5),XY(2),B1(150),B2(150),B3(150)
,B4(150),AP(800)
490 RD$="BM4,6;C2R2BD1R2BR4R2BU1
R2BD2BL4L2D1L2R4D1L2D1R11L2D1L9D
1R9D1L1D1R3BL12L1BR2BU1R1BU1BR4C
4U2L1D2"
500 DRAW RD$+"BM10,16C2R1BR11R1"
:GET(4,6)-(22,17),RA,G:PCLS3:DRA
WRD$+"BM6,16C2R1D1L1BR9R2U1L1":G
ET(4,6)-(22,17),RB,G:PCLS3:'REIN
DEER
510 DRAW"BM10,16;C1R4D1L1D2R1D1R
10U4R21D3L2D2L2D2L31U2L2U2L2U1R2
U1R2BD7BL3L3D2R1D1R1D1R39L4U1L1B
L1BU1L1BU1L1BU1L2BD1L1BD1L1BD1L1
BD1L11U1L1BU1BL1L1BU1L1BU1L2BD1L
1BD1L1BD1L1":PAINT(27,18),4,1
520 DRAW"BM34,15;C2;R4U1L4U1R4U1
L4BL5BD3C4R6U1L6U1R6U1L6U1R6BD4B
R1C2R5U1L5U1R5BU1BL1C1L3U1R3U1L3
U1R3"
530 DRAW"BM23,20;C2L7U6D5R2C4R5U
1L8BL2C2U1BR2C4R8U1L4C2U1R4U1L4C
4U1C2R4U1L3C4U1R3U1L3R3U2C2U1"
540 GET(4,7)-(45,28),SL,G:PCLS3:
'SLEIGH
550 DRAW"BM2,191;C2;U14L2U1R2U1R
2U1R2U1R2U1R2U1R2U1R2U1R2U1R2D1R
2D1R2D1R2D1R2D1R2D1R2D1R2D1R2D1L
```

```
2D14L28;BM26,172;C4;U4R2D4R2D2U6
;BM8,184;C2;D4R2U4;BM22,184;D4R2
U4":PAINT(4,188),1,2:GET(0,168)-
(34,191),B1,G:PCLS3:'HOUSE
560 DRAW"BM2,191;C2;U13L2R32U1L3
2U1R32L2D15L28;BM8,175;C4;U3R2D3
R2U3;BM24,187;C2;U4R2D4":PAINT(8
,188),4,2:DRAW"BM6,187;C3;U4R2D4
;BM16,187;U4R2D4":GET(0,168)-(34
,191),B2,G:PCLS3:'APARTMENT
570 DRAW"BM2,191;C2;U8L2U2R2U2R2
U2R2U4R2U4L2R2U2R1D2R2L2D4R2D4R2
D2R2D2R2D2L2D8L13":PAINT(8,188),
2,2:DRAW"BM6,186;C3;D4R2U4R2D4;B
M26,191;C1;U1L6R13L2U1L8R1U1R5U1
R2L8R2U1R4L2U1U1R2L5R2U1U1":PAIN
T(26,190),1,1
580 GET(0,168)-(34,191),B3,G:PCL
S3:'CHURCH
590 DRAW"BM14,191;C1;U2L12U1L2R2
U1R2U2L2R2U1R2U2L2R2U1R2U2L2R2U1
R2U2L2R2U1R2U2L2R2U1R2U2L2R2U2R2
D2R2L2D2R2D1R2L2D2R2D1R2L2D2R2D1
R2L2D2R2D1R2L2D2R2D1R2L2D2R2D1R2
L2D1L24":PAINT(8,188),1,1:'TREE
600 PSET(14,168,2):PSET(16,173,3
):PSET(12,176,4):PSET(14,178,2):
PSET(18,181,4):PSET(8,180,3):PSE
T(10,183,3):PSET(16,182,2):PSET(
22,185,3):PSET(6,186,4):PSET(4,1
88,2):PSET(12,187,3):PSET(24,188
,4):GET(0,168)-(34,191),B4,G:PCL
S3:'TREE LIGHTS
610 R=RND(4):ON R GOTO 620,630,6
40,650
620 X1=RND(20):X2=X1+38+RND(20):
X3=X2+38+RND(20):X4=X3+38+RND(20
):GOTO 660
630 X2=RND(20):X1=X2+38+RND(20):
X3=X1+38+RND(20):X4=X3+38+RND(20
):GOTO 660
640 X4=RND(20):X3=X4+38+RND(20):
X2=X3+38+RND(20):X1=X2+38+RND(20
):GOTO 660
650 X4=RND(20):X2=X4+38+RND(20):
X3=X2+38+RND(20):X1=X3+38+RND(20
)
660 I1=RND(255):I2=RND(255):I3=R
ND(255):I4=RND(255):I5=RND(255)
670 J1=RND(170):J2=RND(170):J3=R
ND(170):J4=RND(170):J5=RND(170)
680 Z=RND(100)+50:FOR I=1 TO 6:Y
(I)=Z:NEXT
690 PLAY"T255L255O1V30"
700 GOTO 90
63990 PMODE0,1:PCLEAR1:GOTO 3
```

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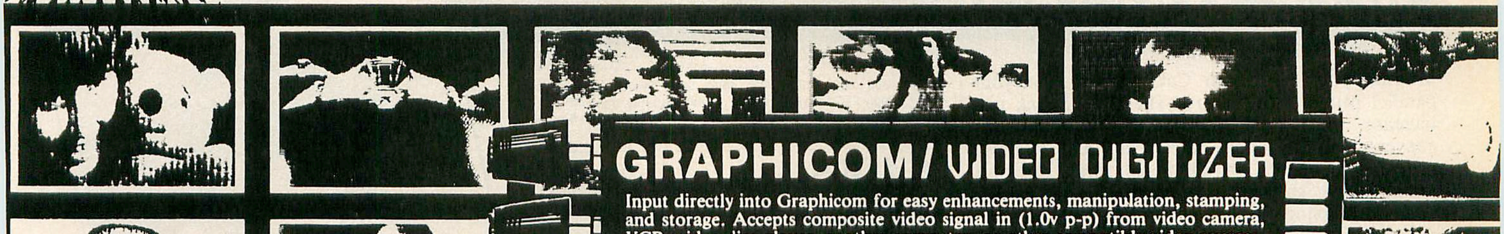

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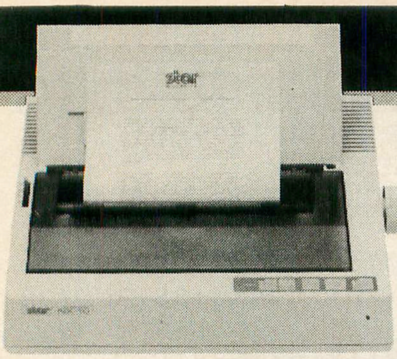

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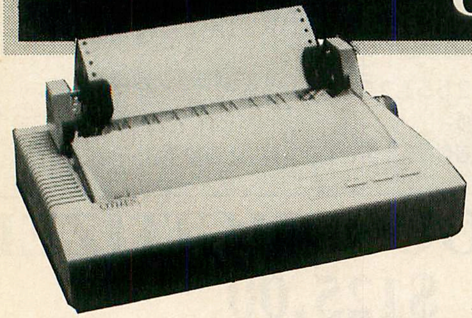

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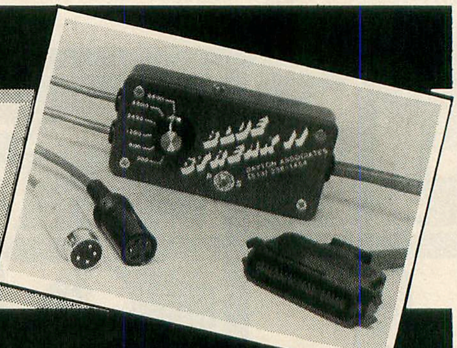

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RECEIVED AND CERTIFIED

The following products have recently been received by THE RAINBOW, *examined by our magazine staff and approved for the* Rainbow Seal of Certification, *your assurance that we have seen the product and have ascertained that it is what it purports to be.*

This month the Seal of Certification *has been issued to:*

3-D Graphics, a 64K program that allows simultaneous rotation, movement, zoom and animation of 3-D graphics images. An editor is also included that allows the user to create and edit three-dimensional data. *Logicware, 730 W. McDowell Road, Phoenix, AZ 85007; (602) 821-2465, $32.95 plus $3 S/H.*

Avatex 1200 Baud Modem, is Hayes compatible and has auto-dial/answer. Requires modem cable. *Spectrum Projects, Inc., P.O. Box 264, Howard Beach, NY 11414; (718) 835-1344, $129.95; cable $19.95 plus $3 S/H.*

Banner — Roman Type, a 16K program that makes banners for parties, clubs, schools, etc. Seven-inch characters are printed horizontally on the printer so you can make them any length you want. *B. Erickson Software, P.O. Box 1109, Chicago, IL 60611; (312) 276-9712, $25.*

Basic Spanish, an introductory course for the CoCo. This series of 16 full-length programs covers much of the first semester study of the Spanish language. Both interactive data and audio are on the cassettes, completely synchronized. The 16 lessons, each with an hour of study, are recorded on eight cassettes supplied in a leatherlike album. *Dorsett Educational Systems, Inc., Box 1226, Norman, OK 73070; (800) 654-3871, $99.*

Bowling League Secretary Version 1.1, a 64K program to aid in bowling team stats. This new version allows maintenance of separate statistics for men and women in a mixed league. *Tomela*Co, P.O. Box 2162, Doylestown, PA 18901; (215) 968-4271, $49.95.*

Chess-007, a 32K ECB game requiring two joysticks. High technology comes to the aid of chess players. This game allows you to record any game with multiple variations and lets you review your favorite openings or grandmaster games prior to competition. *ChessTech, Ltd., 3080 Trenwest Drive #2, Winston-Salem, NC 27103; (919) 768-2370, disk $69.95; tape, $59.95.*

CoCo Jokester, a disk full of endless jokes. Radio Shack Sound/Speech Cartridge required. *Thinking Software, 46-16 65th Place, Woodside, NY 11377; (718) 779-6860, $24.95.*

Full Screen Editor & Varisave, a 64K screen editor for the Color Computer. This program is written in a form that conserves the CoCo's memory — no memory is taken away from what is used to store BASIC programs. *Warren & Associates, P.O. Box 5120, Virginia Beach, VA 23455; (804) 475-2557, $25 plus $1.50 S/H.*

Gantelet, a 64K game that two or three people can play at the same time. Travel through many levels in search of an exit to the next level. Avoid the ghosts and other creatures that are out to stop you in your quest. *Diecom Products, 6715 Fifth Line, Minton, Ontario, Canada L9T 2X8; (416) 878-8358, $28.95; $38.95 Cnd.*

Mikeydial, adds to *Mikeyterm* the ability to auto-dial 22 numbers from a menu, automatically set the baud rate, and load a different set of three macros for each directory choice. *Spectrum Projects, Inc., P.O. Box 264, Howard Beach, NY 11414; (718) 835-1344, $19.95 plus $3 S/H.*

Presidential Decisions of George Washington, a 32K disk ECB political Simulation. You are presented with ten issues that President Washington had to face, and the object is to make the same decisions. This program is an excercise in critical thinking, packed with interesting historical data. *B5 Software, 1024 Bainbridge Place, Columbus, OH 43228; (614) 276-2752, $31.95.*

Puzzle Math, a 64K educational program that requires one disk drive. *Puzzle Math* comes complete with 18 Hi-Res graphics pictures that are utilized in the learning process as puzzles. Each picture can be treated as an 8, 12, 16, 24 or 48 piece puzzle. When the student answers a problem correctly, a piece of the puzzle is displayed. The program is targeted for grades 2-5 and is written to handle four levels of difficulty. *SECA, P.O. Box 3134, Gulfport, MS 39505; (601) 832-8236, $24.95 plus $3 S/H.*

The *Seal of Certification* program is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a *Seal*, the magazine certifies the product does *exist* — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW reviewers for evaluation.

— Judi Hutchinson

Go Online With Avatex 1200 Modem

The Avatex 1200 is a small, compact 300/1200 baud selectable modem marketed by Spectrum Projects for the Color Computer.

I have been using my old, trusty Modem 1 for a few years now and was delighted to get a chance to review the Avatex.

It's very attractive in its beige plastic case that measures 4⅝ wide by 9¼ long by 1¾ inches high. It's well-packaged in a colorful carton and is supplied with a wall transformer for the power supply. An easy-to-read, 29-page illustrated booklet is included, along with two loose sheets that deal with technical information and how to hook it up to your CoCo. I hooked it up in less than 10 minutes and immediately went online to Delphi.

What a difference 1200 baud makes! Using *Mikeyterm* and my old 300 baud modem, I was able to easily read the text as it was displayed on the screen, but at 1200 baud the cursor seems to fly across the screen — so fast, in fact, that multiple cursor images seem to appear! Obviously, the beauty of such a fast modem is that you can reduce your online time, thus saving money.

While Spectrum advertises this product as "Hayes compatible," it's not totally compatible since it does not support all of the Hayes commands.

But, this modem is *largely* Hayes compatible and can be used in place of a Hayes in most cases. For example, if you wanted to use this modem for an auto-answer BBS, the only means for software disconnect after the user has logged off is by toggling the DTR line (RS-232 Pin 20) off, then back on to enable it to answer the next call. It will not automatically return to the command mode, therefore toggling the DTR is the only means of hanging up the telephone under computer control. What this means to those of you who want to use this modem for a BBS, is that you will have to use the Deluxe Radio Shack RS-232 Program Pak and suitable software that will enable this toggling (RS-232 Pin 20 low to high). It is also compatible to Hayes in the sense that it uses similar commands and is capable of auto-dial, redial, and auto-answer. If you are like most CoCo users, these are all of the features you need anyway, and this product clearly fills those needs.

Logging onto Delphi is easy using the auto-dial feature. After turning the unit on and selecting 1200 baud, you put the voice/data switch in the data position. I put *Mikeyterm* in the Combat mode and typed: `ATDT` *telephone number* and pressed `ENTER`. As soon as connection is made, the screen displays `CONNECT 1200`. If instead you see `NO CARRIER`, then your call was not completed either because the line was busy or there was no modem at the number you told the computer to dial. You can automatically redial when you see the no carrier message by simply typing `A/`. Avatex then redials the last number you entered. If you would rather run the modem at 300 baud, the connect message will simply read `CONNECT`, so it's an easy reminder that you are not running at optimum speed.

Besides the three push buttons on the front of the modem, there are also eight red rectangular LEDs for indicating power on, terminal ready, send data, receive data, high speed (1200 baud), modem check, test mode and ring indicator (for incoming calls).

These LEDs, combined with an eight-position DIP switch on the back of the modem, enable you to conduct several tests that will assist you in locating operational problems should they occur.

I should also mention that if you want to use this or any other 1200 baud modem on your CoCo, you will need an RS-232 pack and an RS Catalog No. 26-1408 male-to-male cable (DB-25). You can use this modem without the RS-232 pack, but you will be restricted to 300 baud using the "bit banger" four-pin DIN socket on the back of the CoCo. In this case you will need RS Catalog No. 26-3014, which is a four-pin DIN-to-male cable.

I really like this product. It comes with a two-year limited warranty and the price is right, which makes it a real winner in my book. It will provide most CoCo users with all the modem they are likely to want or need, and at such a reasonable price it can be paid for with the money you will save by being online less.

(Spectrum Projects Inc., P.O. Box 264, Howard Beach, NY 11414; 718-835-1344, $129.95 plus $3 S/H)

— Jerry Semones

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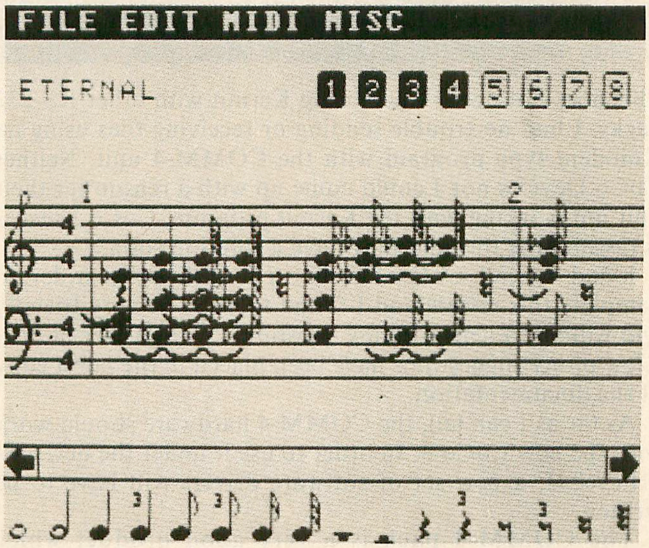
The CoCo Comes to Life With the Sounds of *Lyra*

As a serious musician who plays only for personal enjoyment, I was elated to receive a package from Speech Systems. I have enjoyed *Musica* and *Musica II*, and now I had a chance to try out the new *Lyra*.

Lyra is an eight-voice music editor for the Color Computer. It allows the user to enter, edit and play music. It gives the newcomer to music an easy way to transcribe from piano books, and it gives the serious musician an excellent tool for composing and trying out new ideas.

The *Lyra* package is based on a point-and-click user interface similar to that offered by more expensive software. Entering notes in a given voice simply requires selecting the desired voice, picking out a note value and placing the note on the staff. All that is required is a joystick. Notes may have lengths from a whole note down to a 32nd note. The tonal range allows pitches from A below the bass stave to E above the treble stave — a range of four and one-half octaves. When you have worked on one voice, just select another and enter the harmony.

Lyra offers several editing features. You can quickly and easily change the time signature, key signature and master tempo by using the pull-down edit menu. You can also mark a block of the musical score for later copying or deleting. Any note can be deleted or changed in the wink of an eye.



The edit window of *Lyra*. Only four voices have been used in the example.

One thing was difficult to get used to. With *Musica*, the user is required to press I to insert a note. On the other hand, *Lyra* is *always* in the insert mode. Just position the cursor between the notes where you want to insert, and press the firebutton. Once you get the hang of this, it becomes quite easy to use.

Several choices for playing your creation are included with *Lyra*. First, you may send music to the TV. Or, you could select the included drivers to send music to a Stereo Pak or an Orchestra 90 Program Pak plugged into a Multi-Pak Interface (MPI). Only four voices are playable via these methods.

One way to hear all eight voices is to use the *Symphony 12 Enhancer* with a Symphony 12 cartridge in the MPI. I was very satisfied with the resultant sound. The timbre, or harmonic content, is not alterable as it is in *Musica*, but the ability to hear eight voices far outweighs this.

Another method for hearing eight voices is to connect your CoCo to a MIDI synthesizer. Unfortunately, I do not have access to a MIDI, but the options this device offers had my mouth watering, and Christmas isn't that far away. Options include setting up complete instrumentation, changing MIDI velocities and altering MIDI channels. Another feature in the MIDI pull-down menu is the Transpose selection, which works with other output options.

As mentioned before, I received the *Symphony 12 Enhancer* with my review package. This works very well and is simple to install in your *Lyra* system. Just load it in and go! I also received *Lyra Convert*. This package allows one to convert a standard *Musica II* file to *Lyra* format for editing and playing. I tried this on several files and all of them transferred without incident. The only problems associated with this are that tone tables are lost in the *Lyra* format and the version of *Lyra* I had does not support 64th notes. I have been told by Speech Systems that this has been corrected in a more recent version. Also, the *Lyra Convert* documentation warns of this and offers several reasonable solutions.

While *Lyra* does not offer some features that *Musica* users may be used to, I am told we can expect the works on this package as well. The people at Speech Systems have dedicated themselves to providing top-quality sound software and hardware at a good price. They have succeeded.

My overall impression of *Lyra* and the other packages I received is that they are quite good. I thought having four voices with *Musica* was awesome. Then Speech Systems released *Musica II*. Now, hearing eight separate voices come out of my little gray CoCo shows me what creative programming can really do! *Lyra* definitely gets a 95 on a scale of 100. (I reserve the remaining five points for the future.)

(Speech Systems, 38W255 Deerpath Road, Batavia, IL 60510; 312-879-6880, disk only, $54.95)

— Cray Augsburg

Hint . . .

A Simple Printer Switcher

For those who have more than one printer, and don't like hooking and unhooking the RS-232 cable, try adding a piece of ribbon cable to the RS-232 connector and put another RS-232 plug on the other end to form an RS-232 "Y" cable. Simply turn on and off the printer not needed. I get a warning light on my MDP-200 when I use my Smith-Corona L-1000, but it works great and is a lot easier.

Fred Schmidt
Westminster, CO

COMM-4 Board Gives CoCo Four RS-232 Ports

One of the few deficiencies the CoCo has is its lack of a standard RS-232 port. There is the 5-pin DIN RS-232 port, the so-called "bit banger" port, but it has a non-standard connector and, having been designed as a printer port, it has trouble with speeds above 1200 bits per second.

In order to make up for this, CoCo Devices has introduced the COMM-4 RS-232 interface. The COMM-4 unit is designed to plug into a multipack-type interface. It provides the CoCo with four standard RS-232 communications ports ready to hook up to modems, printers, terminals and any other standard RS-232 equipment.

The COMM-4 unit is about the same size as the disk controller and may be plugged into any slot of the multipack. Installation of the hardware is very simple, because the unit is plugged into any free slot on the multipack. A small cable then runs from the COMM-4 pack to the standard printer/modem port on the CoCo. This cable provides the interrupts needed for the COMM-4 unit to operate. The cable is only about 2 feet long and may be a little short for some arrangements of hardware. I had to slightly re-arrange my setup in order to use it.

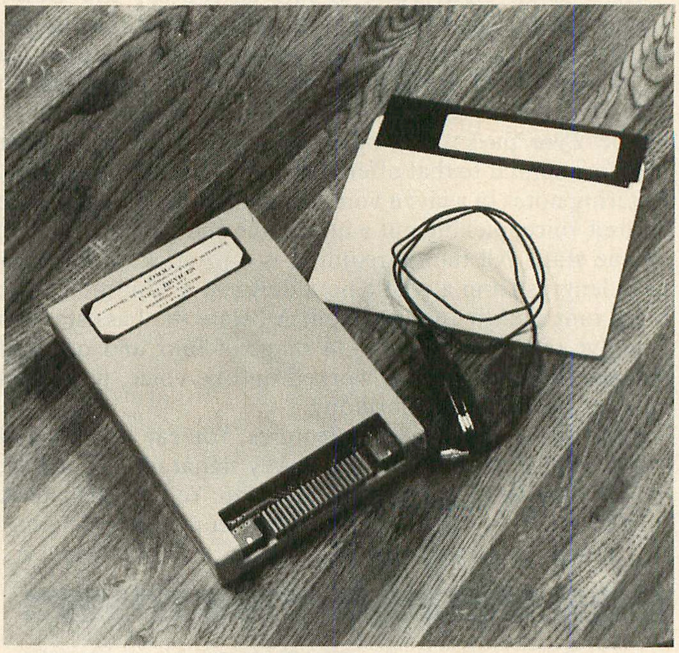
Installing this cable means you no longer have use of the standard printer/modem port. You must re-cable whatever device(s) you had plugged into the standard port to the COMM-4's standard RS-232 ports. Having the COMM-4 plugged into the multipack and the cable plugged into the printer/modem port, the hardware installation is complete.

The COMM-4 unit is designed to be used under OS-9. The only support for Disk Extended BASIC provided with the COMM-4 is a short program to allow one of the COMM-4 ports to act as a printer. There is no reason that BASIC drivers couldn't be written to fully use the COMM-4. The documentaton provides enough information for a good assembly programmer to write them.

Under OS-9, full device drivers and device descriptors are provided. The software, along with its source code, comes on a non-copy-protected disk provided with the unit. Also included are several script files to ease installation. Instructions are provided to guide a user in installing the COMM-4 software under both OS-9 Version 1.01 and 2.0. Though the instructions are clear and rather easy, they assume that the user has two disk drives. No installation instructions are given for single-drive users.

Aside from not having single-drive installation instructions, the documentation is excellent. It has sections on the theory of the hardware and the software, installation, applications examples, a full schematic of the unit, a complete parts list, an assembly drawing of the PC board and printed listings of the source code to all the software provided with the unit. The manual is written in a clear and straightforward manner. Its style varies depending on the subject being covered. The theory sections are written in a technical style, while a simpler style is used in the installation and use sections. All the program listings are well-commented and fairly easy to comprehend. There are good examples of device drivers and descriptors for anyone thinking of writing his own device software.

The COMM-4 board worked almost without flaw. I used it to drive a printer, a modem and a second terminal all at the same time and at many different combinations of baud rates and word sizes. The COMM-4 unit worked well except for one program: For some reason, the Kermit protocol program when used with the COMM-4 unit caused the CoCo to spontaneously re-boot when I tried a file transfer. This does not occur when using Kermit with other RS-232 packs. I had no trouble sending or receiving files using an Xmodem type program with the COMM-4 unit. Neither CoCo Devices nor I could come up with a reason for their unit not working with the Kermit program. CoCo Devices is researching this and may have a solution soon.



I had to call CoCo Devices a few times in order to complete this review and I found them to be very friendly and willing to help with my questions. As a matter of fact, a few of my suggestions have been placed in the latest copy of the documentation.

As far as I can tell, the COMM-4 hardware should work with the new CoCo 3. In order to use it under the new OS-9 Level II, a new set of software drivers will have to be written.

The COMM-4 pack is a very good product which provides the CoCo under OS-9 with four standard RS-232 I/O ports. It is easy to install both the hardware and software. The documentation is an example to other manufacturers on how to write documentation. I highly recommend this product unless you have need of the Kermit communications protocol.

(CoCo Devices, Box 667, Seabrook, TX 77532; 713-474-3232, $99.95. Requires multipack and OS-9 Version 1.01 or 2.0)

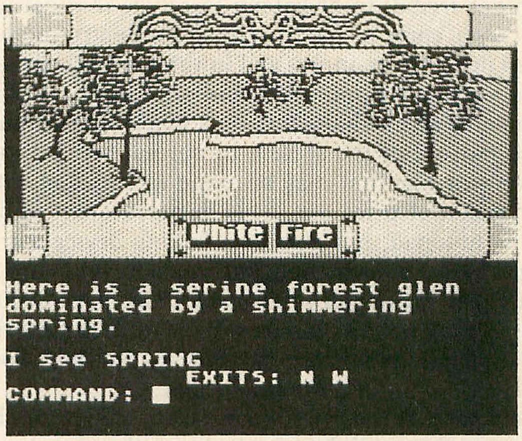
— Mark Sunderlin

White Fire of Eternity Heats Up the Desire for Adventure

White Fire of Eternity is a new animated graphics Adventure from Saguaro Software. The graphics are outstanding, made even more so by the use of animation. The Adventure itself has a fairly good plot but a limited vocabulary.

White Fire is supplied on a copy-protected disk — one of the game's negative aspects, especially since it accesses the disk often — and works on any 64K CoCo.

Visually, *White Fire* is quite an achievement. The graphics, done with *CoCo Max*, are excellent, and author Glen R. Dahlgren has added a nice touch by having the pictures slide up into an area of the screen in the shape of a scroll with the words *White Fire* on it. The program has to load each new scene from the disk, causing a few seconds delay whenever it needs a new picture. I found this slightly annoying at first, but got used to it after playing for awhile.



```
Here is a serine forest glen
dominated by a shimmering
spring.
I see SPRING
          EXITS: N W
COMMAND: ■
```

Adding to the graphics is the animation. Moving clouds, billowing smoke and rising bubbles grace the beautiful graphics and add a touch of realism. Not every scene is animated, but enough to give the graphics a "life-like" quality. However, if you are a fast typist, beware! I found that whenever animation was present, the program would miss characters when I typed at my normal speed. "Hunt-and-peckers" or slower typists should have no trouble. On scenes without animation, you can type as fast as you want without suffering any adverse effects.

The scenario, or background, of the Adventure works well. The plot is good, but could be a bit more involved. I would place the Adventure at a medium difficulty level — probably fairly easy for a veteran Adventurer, and possibly a bit hard for someone's first Adventure, but a good challenge for most. The Adventure is not vast, taking place in about 25 "rooms" or areas. Mr. Dahlgren has managed to pack a number of challenges into this area, though, including mazes, puzzles and areas to explore. A game save feature is provided.

White Fire uses the standard two-word command entry, in the form verb noun (for example: `TAKE KNIFE`, `DRINK WATER`, `MOVE ROCKS`). Fishing for the right word to do what you want may take awhile. This is a small point, but there are instances when the game will only recognize one specific word — often one you would not think of. This limitation could have been overcome by providing a list of recognized verbs or by expanding the vocabulary to include several synonyms for a word.

The few quirks in the Adventure do not affect game play in any great measure, but should have been straightened out before the game was brought to market. For instance, you can cut a branch off the dead tree more than once (although cut as often as you like and you can still take only one branch). Also, once you have unearthed the knife, you can use it to carve things even when the knife is not in your possession. (Pretty neat trick, there.) And, the staff seems to have a curious property of becoming invisible when looked at. Still, these quirks are very minor and in no way prevent your solving *White Fire*.

I would advise watching your sanity while playing this game. Getting stuck on a puzzle can, as in most Adventures, be maddening. But with *White Fire*, you're really on your own! No help is ever given, and the game is encoded on the disk, so using a disk zap will not help. This adds to the challenge of solving the game honestly, although if you're really stuck, I did find a way of using a memory zap to look at the Adventure once loaded in memory. *White Fire* is a combination of BASIC and machine language.

The price is, in my opinion, quite fair. To wrap it up, on my 1-5 rating system, *White Fire of Eternity* gets a 4, overall.

(Saguaro Software, 4137 E. Bermuda, Tucson, AZ 85712; 602-881-6786, 64K disk required, $24.95)

— Eric Tilenius

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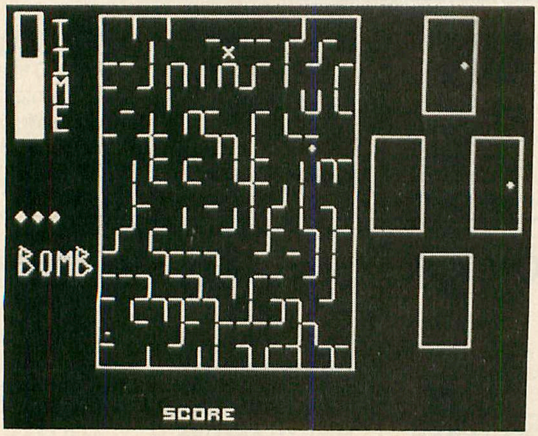
Explore the Maze of the *Dragon's Temple*

Dragon's Temple is a fairly simple Simulation of a knight from King Art's Court on a quest through a maze to find treasure and avoid a deadly dragon. At first, I was a little disappointed in the graphics and the speed of the game. The game consists of a maze, with you, the knight, represented as a '-' and the dragon as an 'X'. Also in the maze are the treasures, '*', that you are to gather. As I said, at first, I was disappointed, but when I realized the game sold for $13.95, I decided it is well worth that price. It is good that someone is still producing challenging programs that the beginning CoCo user can buy at a low cost.

You move through the maze by using a joystick. The maze is only in view while the light is on. Your lantern has little oil in it, so eventually the light will be gone. Once the light goes out, you have to remember the maze the best you can, but you do have help.

You have at your disposal a number of bombs that allow you to blow down a wall, but these bombs are limited and only take down one wall per bomb, so use them sparingly. A few bombs will also be found with the treasures. All this time, the dragon is pursuing you through the maze. You have only a limited time to collect all the treasures. As you collect a treasure, time is added. An analog timer is represented on the left side of the screen. After you gather all the treasures shown, more time is added and new treasures are placed in the maze. The maze does not change as you clear each set of treasures, so when the light goes out, the maze remains the same for each set of treasures.



There was one thing about *Dragon's Temple* I was not crazy about. When you are finally eliminated (killed is so final) and you want to start the game again, it takes a couple of minutes to construct the new maze. You do get a different maze when you start a new quest. It's just a short delay, but after you've been playing hot and heavy for awhile, it seems like an eternity.

Overall, I believe *Dragon's Temple* is definitely worth checking out. The game is challenging and can provide hours of entertainment for a small investment. It requires 64K, one joystick and a disk drive.

(Jade, RFD#2, Box 2740, Clinton, ME 04927, disk $13.95)

— Dale Shell

Lots of Word Processor for the Price With *TX*

I reviewed the early version of *TX*, without much enthusiasm, in the March 1986 issue of The RAINBOW. Well, this latest version is quite a step up from that early one. The general outlines remain the same; *TX* is still written in BASIC and supports a buffer/single file capacity of sixty-six 80-character lines. It still uses the standard 32-by-15 character screen treated as a window over the page. (As one begins, the cursor moves from left to right; however, once the screen corresponds to the right page segment, the cursor appears to stand still and the text moves under it). Calculation, wordwrap, character manipulation and repetition features are similar to those in the earlier version; and again, the documentation is certainly more than adequate.

But there the similarities end. The new *TX* is more smoothly and attractively programmed. Gone, for instance, is the minor irritation of having to retype `RUN` because of the `PCLEAR 1` early in the program. Text entry mode now comes up not only in upper- and lowercase (rather than the previous version's uppercase), but the display is in eye-easing inverse green characters on a black background.

At the bottom of the screen, in normal black-on-green, is a descriptor line that may be saved and loaded with the file, but does not print out. This line serves not only as a single-line notepad, but also as a linking device for chain printing. Thus, *TX*, even though its capacity is but one page, can be used to write and print out a multi-page document by treating each page as a separate file, and chain-printing the files in the desired order via the descriptor line. Possibly a shade awkward, but quite practicable.

TX now permits the insertion of printer codes for change of typeface and underlining, but by line rather than by word. Printer baud rate is easily alterable from within the program without losing text. Another slight inconvenience is that *TX* accepts only files it has created. ASCII files from other word processors may not be loaded into *TX* for editing or printing.

The most striking of the many improvements is the keyboard response speed. I'm no touch-typist, but I have a quite rapid two-to-four-finger technique that left the old *TX* — and just about every other BASIC editor I've tried — in the dust. Not so with the new *TX*. It's fast and accurate (at least as fast and accurate as I am), and comfortable to work with.

Bottom line? The new *TX*, modest though its features are, is a lot of word processor for the money. In spite of its limitations, it handles brief letters and grade school or junior high-level papers easily and smoothly. Moreover, its simple operation makes it a dandy choice for introducing a youngster to the ease and convenience of writing with a computer.

(Kolesar B/S, 7 Ladd Rd., Westfield, PA 16950; 814-367-5384, Disk $16.95 plus $2 S/H)

— John Ogasapian

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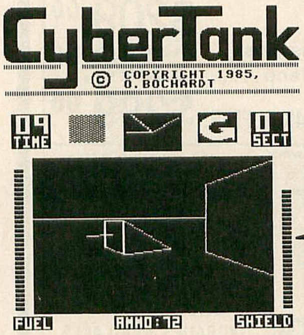

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Inside Information: Comprehensive Survey of Information Industry

Information utilities are companies that sell information, much as the local utility sells natural gas or electricity. Just as there are numerous electric, gas and telephone utilities, there are many information utilities, each providing different kinds of information and different services at varying prices.

Inside Information is an excellent in-depth discussion of these utilities. The intended readership includes professionals and businessmen who frequently need up-to-date or specialized information to pursue their careers. These people will benefit most from reading this book.

This book is written in four parts. The first part provides an introduction to the subject of data communications and describes the necessary hardware and software. It is *not* written around any specific computer, although the author, John Helliwell, considers the IBM PC to be the de facto standard personal computer and the Hayes modem the de facto standard in modems.

The second part (and major portion of the book) describes in detail five types of information utilities: general interest utilities (Dialog and Mead Data Central), bibliographic databases (BRS Information Technologies, SDC/Orbit, Pergamon InfoLine and Wilsonline), news services (Vu/Text, DataTimes, NewsNet, Info Globe and Finsbury Data Services), beginner's utilities (Knowledge Index, Dow Jones News/Retrieval, The Source, CompuServe and Delphi) and specialized databases. Specialized databases include databases for the fields of bioscience and medicine; social sciences, humanities and education; food and agriculture; environment and natural resources; energy; engineering and technology; law and government; trademark and patent; mathematics, chemistry, and physics; and computing and numeric (statistical) databases. He identifies several databases in each category, and compares them to each other in terms of available information, approximate cost and ease of use.

The third portion discusses a related topic — telecommunications (communications between two or more computers, including electronic mail).

The final part of this book is composed of five appendices, which explain "getting the most out of *Crosstalk*" (a communications program written for the IBM PC), "getting the most out of Dialog and Mead Data Central" (two databases described in the book), and the addresses of all the utilities discussed in the first three sections of the book.

I found this book to be well-written and interesting reading. The book is a comprehensive survey of the rapidly growing information industry.

(John Helliwell, New American Library, 1633 Broadway, New York, NY 10019; 212-397-8000 $14.95 U.S., $19.95 Can.)

— Jerry Oefelein

Get Rid of the Excess Baggage With *Packer*

Do you want your BASIC programs to hog less memory? Do you want them to run faster than a speeding bullet? Do you want to do all this with almost no effort? Well then, my friends, you need *Packer*.

Packer is a machine language utility that allows you to do all the above and more. You can fix referenced remarks, that is, those nasty programs that have a statement go to a line that is a remark, except you didn't type in those remarks so you get a UL Error. You can delete all those comments to save memory. If you want your programs really tight, you can remove all the extra spaces, colons and `LET` statements that aren't needed.

Save more memory by removing semicolons that aren't needed in print lists. Get rid of all those unnecessary `GOTO`s after `THEN`s and `ELSE`s. If you're really adventurous, you can join lines together in huge, uneditable lines.

Packer allows you to choose any of the options from the menu. Best of all, you can do all of them automatically by selecting item number 7. Believe me, it isn't as complex as it sounds. The program comes with a comprehensive three-page manual that explains everything you need to know. It even includes warnings like making sure you have the program you're about to pack with *Packer* saved somewhere else because you may not be able to edit the packed version.

I have used and unsuccessfully tried to abuse every feature offered by this program. I saved from three to 27 percent of memory usage in BASIC programs I typed in from RAINBOW listings. I couldn't figure out any easy way to see how much faster these programs would run under packed conditions, but I'm sure it increased the speed just because BASIC has less information to interpret.

One major warning: Make sure you have a good copy of your program before executing *Packer*. One BASIC program I used with *Packer* has some especially tricky graphics statements in the first few lines and, after packing it, the program would not run.

The program reports its movements to either the printer or screen and informs you of the memory saved for each or all the choices you made from the menu. The author never mentioned the program used the default BASIC 600 baud for the printer, so my 1200 baud printer spewed out trash until I set the default to 1200. It would be nice to be able to select the baud rate from the program.

The only other problem I had was that the manual said trailing quotes would be removed from the end of print statements at the end of a line. I couldn't get this to happen, but it certainly is a very minor point.

Speaking of errors, this program even helps you fix your programs by reporting errors such as non-existent lines that are referenced in `ON GOTO` type statements. If no BASIC program is in memory when you execute *Packer*, it stops execution with an error message and goes back to BASIC so you can load one in. Just type `EXEC` and *Packer* takes off again.

I was very impressed with this program and its documentation. If you have disks full of BASIC programs and want to pack more on, or you want those programs to run almost as fast as they will on the new CoCo 3, then I would recommend *Packer*.

(Bob van der Poel Software, 17435-57 Avenue, Edmonton, Alberta, Canada T6M 1E1; 403-481-1037, $14.95 plus $2 S/H)

— *C.L. Pilipauskas*

One-Liner Contest Winner . . .

Just enter your name and a color number, one through eight, and watch the magic happen.

The listing:

```
1 D=3:INPUT"NAME,COLOR";N$,C:Z=L
EN(N$):Y=Z+1:DIMA(Y):A(Y)=127+16
*C:FORI=1TOZ:A(I)=ASC(MID$(N$,I,
1)):NEXT:E=1535:F=E-Z:CLS(C):FOR
X=1TO511:E=E-1:F=F-1:FORI=F TOE:
N=N+1:POKEI,A(N):NEXT:N=0:POKEI-
1,A(Y):D=D+.4:SOUNDD,1:NEXT:PRIN
T@170,N$;:SOUND1,50:CLS:RUN
```

Jeff Harper
Karnack, TX

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book of Simulations* and its companion *The Rainbow Simulations Tape*.)

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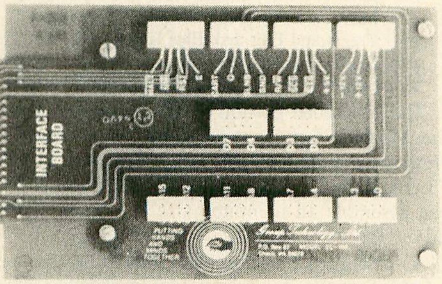

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EDT/ASM 64D

64K DISK EDITOR ASSEMBLER w/DEBUG

EDT/ASM 64D is a Disk based co-resident Text Editor & Assembler. It has a Hi-Resolution 51, 64 or 85 column by 24 line display, so you see your program listings easily. It also supports the PBJ 80 Column Word-Pak cards. The disk also contains a free standing Machine Language Debug Monitor, to help you debug your assembled programs.

The Editor in EDT/ASM 64D is the most powerfull, easy to use Text Editor available in any Editor/Assembler package for the Color Computer. It even has automatic line number generation for easy entry of program material. Some of it's features include:

- ☞ Local and Global string search and/or replace.
- ☞ Full screen line editing with immediate line update.
- ☞ Easy to use Single keystroke editing commands.
- ☞ Load & Save standard ASCII formatted Tape/Disk files.
- ☞ Move or Copy single & multiple text lines.
- ☞ Create and Edit disk files larger than memory.
- ☞ Hi-Res Text Display 28 to 85 columns by 24 lines.
- ☞ Supports the PBJ 80 Column cards Word-Pak I & II.

The Assembler portion of EDT/ASM 64D is the part that creates the Machine Language program. It processes the source file(s) created or edited by the text editor and creates a LOADM or CLOADM binary file on either Disk or Tape. Using library files you can assemble an unlimited size file, using several different disk drives.

- ☞ Supports conditional IF/THEN/ELSE assembly.
- ☞ Supports Disk Library files (include).
- ☞ Supports standard motorola assembler directives
- ☞ Allows multiple values for FDB & FCB directives.
- ☞ Generates listings to Hi-Res text screen or printer.
- ☞ Assembles directly to disk or tape in LOADM format.
- ☞ Supports up to 9 open disk files during assembly.
- ☞ Allows assembly from editor buffer, Disk or both.
- ☞ Full description text error messages.

DEBUG is a free standing program debugger which provides all the functions supported by most system monitors. Some of them include:

- ☞ Examine and change the contents of memory.
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- ☞ Generates Assembler compatible source files directly to disk.
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- ☞ Fully supports the use of 80 column hardware cards.

TEXTPRO III is an advanced word processing system designed for speed, flexability and extensive document processing. It is not like most of the other word processing programs available for the Color Computer. If you are looking for a simple word processor to write letters or other short documents, then most likely you'll be better off with one of the other word processors. But, if you want a powerful word processing program with extensive document formatting features to handle large documents, term papers, manuals, complex formating problems and letter writing, then TEXTPRO is what your looking for. TEXTPRO works in a totally different way than most word processing programs. It uses simple 2 character abbreviations of words or phrases for commands and formatting information that you imbed directly in your text. There are over 50 different formating commands you can use without ever leaving the text your working on. There are no time comsuming, and often furstrating menu chases, you are in total control at all times. The formatted output can be displayed directly on the screen, showing you exactly what your printed document will look like before a single word is ever printed. This includes margins, headers, footers, page numbers, page breaks, underlining, column formating and full justification.

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"The most complete Editor/Compiler I have seen for the CoCo..."
--The RAINBOW, March 1986

CBASIC is for BEGINNER & ADVANCED USERS

CBASIC is a powerful tool for the Beginner as well as the Advanced Basic or Machine Language programmer. You can write programs without having to worry about the Stack, DP Register, memory allocation and so on, because CBASIC will handle it for you automatically. For Advanced users, CBASIC will let you control every aspect of your program, even generating machine code directly in a program easily.

CBASIC adds many features not found in Color Basic, like Interrupt, Reset and On Error handling, and much more.

Commands and Extensive Hardware Support

CBASIC features well over 100 compiled Basic Commands and Functions that fully support Disk Sequential and Direct access files, Tape, Printer and Screen I/O. CBASIC supports ALL the High and Low Resolution Graphics, Sound, Play and String Operations available in Extended Color Basic, including Graphics GET, PUT, PLAY and DRAW, all with 99.9% syntax compatibility. CBASIC also supports the built in Serial I/O port with separate programmable printer & serial I/O baud rates. You can send and receive data with easy to use PRINT, INPUT and INKEY commands.

CBASIC is the only Color Basic Compiler that includes it's own Hi-Res 51, 64 or 85 by 24 line display. It also supports the PBJ "Word-Pak" I, II and R.S. versions as well as the Disto and Double Density 80 column displays. All as part of the standard CBASIC package. You can even include them in your compiled programs by using a single CBASIC command.

CBASIC makes full use of the power and flexibility of the 6883 SAM in the Color Computer. It will fully utilize the 96K of address space available in the CoCo during program Creation, Editing and Compilation. There is a single CBASIC command for automatic 64K RAM control, to allow use of the upper 32K of RAM automatically. When used in compiled programs it will automatically switch the ROMs and RAM in and out when needed. Plus there are two other commands to control of the upper 32K of RAM manually in a program.

CBASIC has its own completely integrated Basic Program Editor which allows you to load, edit or create programs for the compiler. It is a full featured editor designed specifically for writing and editing Basic programs, most likely you'll find you want to use it for writing all your Basic programs. It has block move & copy, program renumbering, automatic line numbers, screen editing, printer control and much more.

"The Editor is a very good one and could be the subject for review all by itself." --The RAINBOW, March 1986

"Comparing ECB's edit mode to CBASIC's text editor is like comparing a World War II jeep to a modern sedan. Both get you to your destination, but what a difference in the ride. -- Hot CoCo, Feburary 1986

The documentation provided with CBASIC is an 8 1/2* 11 Spiral Bound book which contains approximatly 120 pages of real information. We went to great lengths to provide a manual that is not only easy to use and understand, but complete and comprehensive enough for even the most sophisticated user.

"CBASIC's manual is easy to read and written with a minimum of technicalese." --Hot CoCo February, 1986

The price of CBASIC is $149.00. It is the most expensive Color Basic Compiler on the market, and well worth the investment. Compare the performance of CBASIC against any Color Basic compiler. Dollar for dollar, CBASIC gives you more than any other compiler available. Requires 64K & Disk, not JDOS compatible.

"The price tag it carries seemed a bit steep for an integer compiler on first glance, but when you add 64K, hi-res drivers, and full-screen editing, CBASIC begins to look more like a bargain.." -- Hot CoCo February, 1986

"A Complete Editor/Compiler Well Worth its Price"--RAINBOW March 1986

COMMANDS SUPPORTED

I/O COMMANDS: CLOSE, CLOADM, CSAVEM, DRIVE, DSKI$, DSKO$, FIELD, FILES, GET, INPUT, LINE INPUT, KILL, LSET, LOADM, OPEN, PRINT, PRINT@, PUT, RENAME, RSET, SAVEM, WRITE

CONTROL STATEMENTS: CALL, CHAIN, END, EXEC, FOR, NEXT, STEP, GOTO, GOSUB, RETURN, IF, THEN, ELSE, STOP, END, RUN, ON/GOTO, ON/GOSUB, ON ERROR GOTO, ON NMI GOTO, ON IRQ GOTO, ON SWI GOTO, ON FIRQ GOTO, ON RESET GOTO, IRQ ON, IRQ OFF, RAM ON, RAM OFF, RAM64K, IRQ, FIRQ, NMI, SWI, STACK, RETI

COMPILER DIRECTIVES: BASE, ORG, DIM, HIRES, DPSET, GEN, PCLEAR, TRACE ON, TRACE OFF, MODULE

GRPAHICS/SOUND STATEMENTS: PLAY, SOUND, COLOR, CLS, CIRCLE, DRAW, LINE, PAINT, PCLS, PCOPY, PMODE, PRESET, PSET, RESET, SET, SCREEN, POINT, PPOINT, GET, PUT

NUMERIC FUNCTIONS: ABS, POS, RND, PEEK, DPEEK, TAB, ASC, LEN, INSTR, VAL, ERR, ERL, EOF, SWAP, LOF, LOC, FREE, CVN, VARPTR, JOYSTK, SGN, TIMER, OVEREM, DSEARCH, SWITCH, POS@, INKEY

STRING FUNCTIONS: CHR$, LEFT$, RIGHT$, MID$, STR$, TRM$, STRING$, MKN$, INKEY$, BUF$, SWAP$, SWITCH$, HEX$

OTHER/SPECIAL COMMANDS: AUDIO ON/OFF, DATA, DIM, MOTOR ON/OFF, POKE, DPOKE, READ, RESTORE, CBLINK, UNLINK, BRATE, PRATE, MID$=, STACK, VERIFY ON/OFF

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(702)-452-0632

Assembly Language Programming for the TRS-80 Color Computer

Learning to program in assembly language has never been easy. It takes a lot of concentrated study, time and mistakes (unfortunately). While assembly language is technically termed a low-level language, it provides access to each and every function that a computer is capable of performing. By contrast, a high-level language such as BASIC provides only limited access to a computer's full capabilities.

Those wishing to learn the tricks of assembly language programming now have a new tool available in the form of a book entitled *Assembly Language Programming for the TRS-80 Color Computer*, written by Laurence A. Tepolt. Beginners will find the book very easy to follow, while more advanced programmers will find it to be a valuable reference.

Information and concepts are presented in a logical, easy-to-understand order. For instance, when new technical descriptions or terms are introduced, their first usage is highlighted in boldface text to draw attention. Each new concept is followed by at least one example.

The instruction set of the 6809 processor is discussed in detail. Chapter 5 is a valuable reference guide, as it contains a comprehensive explanation of each instruction, how it operates and how the condition codes are affected. This section could be a valuable stand-alone reference by itself.

The book also describes the operation and use of the *EDTASM+* assembler, text editor and monitor. In fact, all of the examples in the book were written using the *EDTASM+* ROM pack, which is probably the most widely used assembler. In any case, the examples may be readily transferred to practically any other assembler.

Next are the practical applications. Perhaps the most sought-after information for new programmers concerns how to interface their machine language programs with BASIC. Fortunately, the book covers a variety of methods for doing so. Attention is given to methods for passing numeric and string information to and from BASIC, as well as the trusted technique of USR calls.

Very good detail is given on the use of ROM routines. Through the use of ROM routines, the assembly language source code may be reduced in size and made more efficient. Practical examples are given for the ROM routines to clear the screen, output a character through the serial port, display text on the screen, get keyboard data, read the joystick values, and do tape and disk I/O. These are subjects that are quite difficult for the student to master on his own, and the book covers them in detail.

Chapters 9 and 10 are devoted to the more advanced topics, such as interrupt processing, the internal control registers and graphics. These topics are very important and are well-covered within the book.

A lot of additional information is provided in the book's appendix — details of the CoCo's cartridge connector, a chart of the 6809E instruction set, ASCII character and control codes, CoCo character and control codes and dedicated CoCo memory addresses. A thorough compilation of this type of data within one publication is very useful, and saves the assembly language programmer a lot of time that might have been spent in searching through several other publications.

While the book presents virtually all the information about CoCo hardware that a programmer needs, there are many more concepts of assembly language programming to be learned. The author himself refers to his book as an introduction to assembly language programming. I call it a *very good* introduction!

(Tepco, 30 Water Street, Portsmouth, RI 02871; 401-683-3019, $16 plus $1.50 S/H. Price increases to $18 January 1, 1987)

— Don Hutchison

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Mikeydial: Making *Mikeyterm* Even Better

Here is a very worthwhile addition to *Mikeyterm* that, when used with a Hayes-compatible modem, provides auto-dial and logon capability. When used with an auto-dial modem and *Mikeyterm*, this program eliminates the need for typing in all those telephone numbers and other logon information for your favorite BBSs.

The program, written in BASIC, automatically loads and executes *Mikeyterm* (you will need it on the same disk). Upon running *Mikeydial* you are greeted with a title page followed by a full page of BBS names you added earlier. Pressing ENTER results in a second page of BBS names. You can toggle between these two pages by simply pressing ENTER again. Each BBS name is preceded with a letter, A to V, so that you have the capability of 22 auto-dial/logon possibilities. In addition to the auto-dial directory there is a command mode that allows you to change several modem parameters. The submenu gives choices for speaker on, full duplex, auto-answer off, carrier on, connect alert off and 1200 baud.

Selecting any of the numbers from 1 to 6 toggles to the opposite parameter such as on/off, full/half, 1200/300, etc. After making your selections and/or changes, press CLEAR to return to the directory mode, or the space bar to go directly to the terminal mode. Assuming you want to use the auto-dial feature of the modem, press CLEAR at this time. When you select any of the 22 available BBS names, the program loads a macro, which in turn commands your modem to dial and log on the BBS of your choice. If the "connect alert" feature is turned on and the modem dials a busy number, you can go about your business while the program instructs the modem to keep trying until connection is finally detected. At that time you will hear a continous warbling tone to alert you to the fact that connection has been established, and the program will wait for you to press any key to go online.

Another nice feature of *Mikeydial* is that it allows you to use a different set of three macros for each different directory, making up for *Mikeyterm*'s ability to handle only three in total. Macros are used to set up the user numbers, passwords and other logon procedures, and each can be different for all 22 BBSs you have programmed into *Mikeydial*. This is a great convenience, in that you will no longer need your BBS log sheet or scraps of paper with similar information.

In order to program the macros, you can use any word processor capable of reading/writing ASCII files, or you could use the buffer entry mode of *Mikeyterm* itself. Since I already had *Mikeyterm* loaded in the computer, I elected to use the buffer entry mode. It was quite easy to do, as the instructions that come with *Mikeydial* point out. You simply follow a specified sequence of entries, the first being the BBS name followed by the telephone number you want dialed. Then there are three macros that contain other logon information such as your user name and password. The last entry contains the baud rate at which you want to connect to the BBS.

I believe that *Mikeydial* is an excellent program that increases the usefulness and power of *Mikeyterm*. Dave Haber of Foxx Software has done a nice job on this program. Once you couple this program with *Mikeyterm* and a modem, you will have a combination that's hard to beat.

(Spectrum Projects Inc., P.O. Box 264, Howard Beach, NY 11414; 718-835-1344, $19.95 plus $3 S/H)

— Jerry Semones

One-Liner Contest Winner . . .

This program will display the characters in the RAM/ROM of your Color Computer. It also features a sound output to entertain most anyone within earshot.

The listing:

```
0 CLS:FORX=1TO65535:A=PEEK(X):PR
INTCHR$(A);:IFA<1THENNEXTELSESOU
NDA,1:NEXT
```

David Cross
Bonaire, GA

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book of Simulations* and its companion *The Rainbow Simulations Tape*.)

BASIC COMPILER

MLBASIC 1.0 - BASIC COMPILER

Compiled Program Speed (Time in minutes:seconds)

Program	Interpreter	MLBASIC
Eratosthenes Sieve	6:58.7	0:06.3
Matrix Fill,Mult,Sum 10x10	0:30.9	0:02.5
String Manipulation	6:22.5	2:17.7
Floating Point	0:32.6	0:30.6
Disk I/O (2000 PRINT/INPUTs)	2:21.5	0:27.6

Additional Features not found with RS BASIC

The SUBROUTINE command is used to declare the beginning of a sub-program. The CALL statement is used to call that sub-program, just as GOSUB100 calls a subroutine at line 100. The subprograms contain a list of parameters that are "linked", or referenced, to the variable that is likewise used in the parameter list of the CALL statement. All variables that are not referenced in the parameter list are used as local variables within each subprogram. In other words, variables in the subprogram do not affect the same variables in the calling program. The following is an example using CALL and SUBROUTINE:

```
10 INPUT"ENTER A NUMBER ?";A:PRINT
20 CALL CUBE(A)
30 PRINT"A Cubed=";A:STOP
40 SUBROUTINE CUBE(B)
50 B=B*B*B
60 RETURN
```

MLBASIC has several commands that offer extended programming capability. These commands are used for double byte PEEKs and POKEs, transfering blocks of memory, executing machine language routines in ROM, and manipulating the hardware registers.

More Reasons to buy MLBASIC Today

Three data types are allowed with MLBASIC. They are 16 bit INTEGER, 40 bit FLOATING POINT (with the same precision as with RS BASIC programs), and CHARACTER.

String manipulation speed is 5 times faster than RS BASIC string handeling. A Fully detailed 154 page manual is included that not only explains how to use MLBASIC, but also is an easy to use reference manual for all commands offered with MLBASIC.

(See our other ad in this magazine for more details on the BASIC Compiler, MLBASIC)

Write us for more details on an ENHANCED version of MLBASIC for the COCO 3

WASATCHWARE

7350 Nutree Drive Salt Lake City, UT 84121

Little Letters Encourages Mastery of Lowercase

Do you know a child who has mastered uppercase letters but is struggling to learn the lowercase alphabet? Bob's Software has the program to help.

This program displays a lowercase letter on the screen and waits until an uppercase letter is pressed. When the correct choice is made, a balloon slowly rises from the bottom to the top of the screen and a new letter is shown. If an incorrect key is selected a buzzer sounds, the appropriate uppercase letter is displayed briefly next to the lowercase letter and another chance is given.

People who have one of the voice packs and who place the translator program on the disk with *Little Letters* will also hear spoken rewards, which enhances the program for the child.

All instructions are included in the program, although if you want to use a voice pack, you need to refer to its instructions and provide your own translator program. Bob's Software distributes *Little Letters* as freeware and encourages distribution of the program. To become a registered owner and receive a catalog of other free programs you are asked to send $15.

The program works well, the letters are drawn clearly, and it is well suited for children who require a great deal of practice before mastering skills.

(Bob's Software, P.O. Box 391, Cleveland, OH 44107; 216-871-8858 $15 to become a registered owner)

— Carol Kueppers

One-Liner Contest Winner . . .

Here's one for the Ham! This program computes the lengths of the sides of a two-element Delta Loop antenna as well as the spacing of each element.

The listing:

```
0 CLS:PRINT"  DELTA LOOP ANTENNA
 DIMINSIONS":PRINT:INPUT"XMIT FR
EQ. IN MEGAHERTZ";F:D=(1005/F)/3
:R=(1030/F)/3:SP=(300/F)*.17:PRI
NT"DIRECTOR=":PRINTD"FT. PER SID
E":PRINT"REFLECTOR=":PRINTR"FT.
PER SIDE":PRINT"APROX. SPACING B
ETWEEN ELEMENTS="SP"FT."
```

Timothy Johnson
Tulia, TX

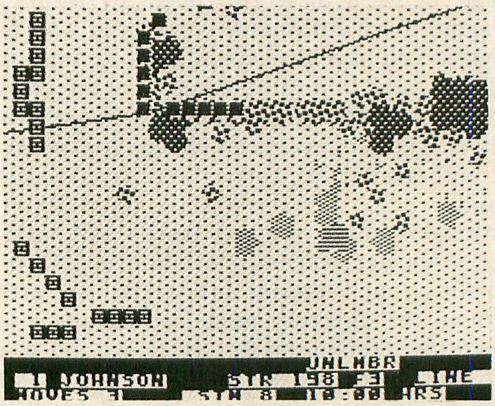
(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book of Simulations* and its companion *The Rainbow Simulations Tape.*)

Battle Hymn: The Battle of Gettysburg

The battle lines are drawn. As Commanding General Lee of the Confederate Army, you are in charge of 39 divisions attempting to turn back the Union Army.

Battle Hymn is a Hi-Res battlefield Simulation for a 64K ECB Color Computer. It comes on either tape or disk with a well-written and informative eight-page instruction booklet. The machine language program is not copy protected, and backup copies for the buyer's own protection are encouraged.

The Simulation is easy to load and execute in the conventional manner. The playing screen is divided into two sections. The larger, upper half contains the map-like representation of the battlefield at Gettysburg during the Civil War. The bottom section of the screen contains the commands and status lines. The Union Army's positions are clearly identified by an American flag, while your Confederate positions are identified by an X.



There is also a facing clock that is used to determine which way a unit is facing. This is very important since a unit can only fire in the direction it is facing. The facing is shown at the bottom of the screen as part of the command/status display. To check which way the Union divisions are facing, press `U`. In addition, the field of fire can be displayed by pressing `A` for the area affected.

To make the Simulation even more realistic, the author has built in a stamina factor which affects losses under fire. Stamina is affected by fatigue, which in turn is caused by not resting or troops in rout. Some cute sound effects also add another degree of realism.

The graphics in this Simulation are fair. As you might expect, there is little in a map to get excited about, but on the other hand, this Simulation is not a shoot-'em-up arcade game. History buffs and those with military or battlefield interests will love it.

A great deal of strategy has been programmed into *Battle Hymn*. You would be wise to read up on the Civil War before you try it. Personally, I did no better than my forefathers. I, too, met my fate at the hands of General Mead.

(Ark Royal Games, P.O.Box 14806, Jacksonville, FL 32238; 904-786-8603, tape $29; disk $31)

David Gerald

It's here!

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ANOTHER GREAT SERVICE FROM THE LITTLE ELVES AT THE END OF THE RAINBOW

Remember the story of the cobbler and the elves, when the little people crept into the old man's shop and did all his chores while he slept? Well, there is a monthly chore we can now eliminate for you — transferring RAINBOW ON TAPE to disk! Now, in addition to RAINBOW ON TAPE, we're offering RAINBOW ON DISK, the perfect companion to RAINBOW magazine for all our readers with disk drives. No more typing. No more transfers. We take care of all the work for you.

OS-9 programs

Thanks to the elfin magic going into RAINBOW ON DISK, part of one side of the disk is formatted for the OS-9 operating system. That means that you can now get all the OS-9 programs from the magazine — programs that cannot be put on tape. And, with the introduction of the new CoCo 3, OS-9 programs will become more and more prevalent.

More than two dozen programs

If you're a RAINBOW reader and you have a disk drive, you won't want to go another day without RAINBOW ON DISK. For only $99, 12 full issues of RAINBOW ON DISK will follow the RAINBOW to your door. That's only $8.25 for each disk.

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RAINBOW ON DISK and RAINBOW ON TAPE are not stand-alone products, but are intended as adjuncts and complements to the magazine. Even if you purchase RAINBOW ON DISK or RAINBOW ON TAPE, you will still need the magazine for loading and operating instructions. For information on RAINBOW ON TAPE, see Page 160.

To order by phone (credit card orders only), call 800-847-0309, 8 a.m. to 5 p.m. EST. All other inquiries call 502-228-4492.

Hardware Hackers Delight: D & A Research Digital Memory Scope

Have you ever thought the uses for your CoCo were limited? I hope not! D & A Research of Satellite Beach, Fla., has come up with a novel use for your favorite computer that makes it much more valuable if you like hardware experimenting.

This review focuses on the DMS-3B Digital Memory Scope, but we will look at this series of hardware add-ons in a broader sense. Actually, the scope can be be purchased as a complete kit for $169, but the individual boards can be used for many other purposes. The following boards comprise the kit: a J110K CoCo Bus Adaptor, a J105B Buffer Board, two J107B I/O Ports, a J202B A-to-D/D-to-A Board, one probe, one printer cable and a power supply. A 64K CoCo is required, and the review sample had the software on tape.

The J110K CoCo Bus Adaptor is a small circuit board that connects the CoCo to the rest of the D & A Research boards. It really has no stand-alone capabilities other than passing data lines D0-D7 and address lines A0-A7 to peripherals. Address lines A13-A15 are decoded to provide a directional data bus. Out and In signals are provided to the auxiliary bus. Connections to this circuit board are made using edge-type connectors.

The J105B Buffer Board provides bus isolation, better known as buffering, between the J110K and any peripherals. The same signals passed by the bus adaptor are buffered using 74LS245 bi-directional data buffers and a 74LS32. Connections to this board are made using DIP connectors.

The J107B I/O Port is the heart of the expansion interface. With the use of hardware decoding and software, the eight-bit data bus can be addressed as a port with any number between 0 and 255. Each J107B can be used to provide one 8-bit digital input and one 8-bit digital output. The port address is selected using an eight-pole DIP switch on the board. A 5-volt, wall-type DC power supply is necessary for these boards to operate. Connections to the boards are made using DIP headers. Output status is indicated by use of LEDs for each bit.

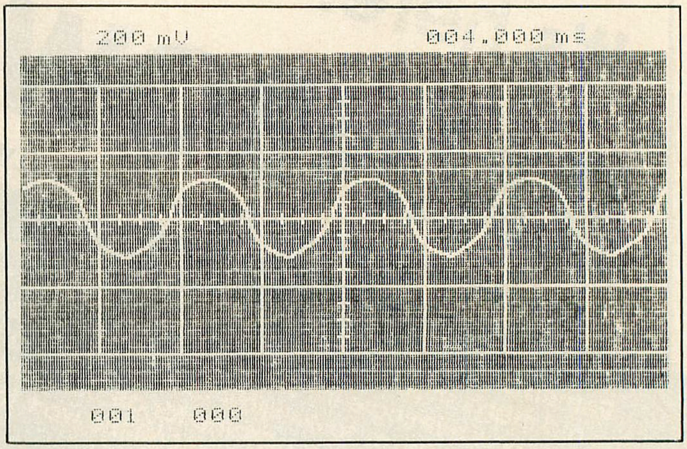
A keyboard driver is used as an example of a practical application of these three boards.

The J202B A-to-D/D-to-A Board contains a DAC0807 D-to-A converter and a DAC0804 A-to-D converter to further expand the capabilities of this bus. In addition to the 5 volts previously mentioned, +/-9 volts are necessary. These voltages are generated by the use of inexpensive transistor batteries.

The information on the input and output voltage and impedance is sketchy, to say the least, but it appears to be -2.55 to +2.55 volts, corresponding to the digital value read from, or stored to, the port. Four values of sensitivity are hardware selectable. When the sensitivity is increased, the input range is decreased. The sample rate of the A-to-D converter is adjustable from 3 KHz to 10 KHz.

The digital side of the analog input contains an LED display. Asynchronous and synchronous operation is hardware selectable. Clock frequency and gain are adjustable by means of pots on the board.

If you purchase the entire kit including the two J107Bs, you receive a probe for the A-to-D converter and software that can be used to convert your CoCo to an oscilloscope. It works, too! The software contains a screen dump routine for an Epson MX-70 printer. Therefore, you have the DMS-2B Digital Memory Scope at your disposal. An example of the output is shown below.



The review package came in an attractive sheet metal enclosure measuring 8 by 6 by 2½ inches. The front panel included power supply switches, a jack for the 5-volt wall supply, the analog input and output jacks and a DB-25 connector labeled Port A. LEDs indicate all power supply voltages. From a hardware standpoint it is impressive.

The manuals are a different story. Adequate instructions are given in general terms. Each board contains an example of a use, such as a BASIC program convertor from a Model I to a CoCo, but specific information is lacking for the operating parameters and board specifications. The manuals assume you have enough background to figure it out from the schematic diagrams.

I would recommend this kit, or any of the individual boards, for only the experienced hardware hacker. At the same time, the assembled package has excellent potential for advanced educational use. The only drawback is the documentation. I think the price is reasonable.

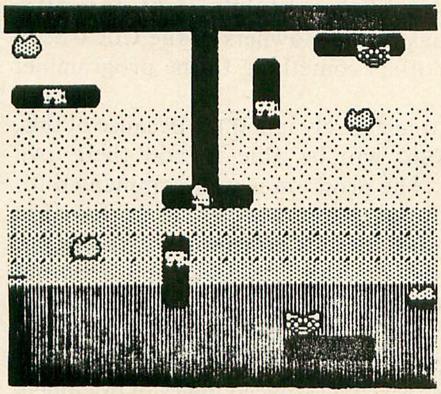
(D & A Research, 400 Wilson Ave., Satellite Beach, FL 32937; 305-777-1728, DMS-3B kit, $169)

— Dan Downard

Happy Holidays

From your friends at RAINBOW

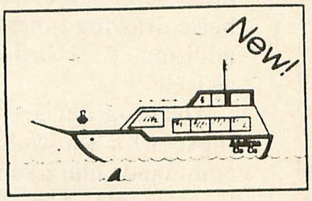
Holiday Greetings



Pumpman

You'll dig this 100% ML arcade game! The Pumpman carries a pump that he fires at aliens Pooky and Dragon as they change forms and chase him around underground 15 different screens, "pause game" feature, bonuses. As fun and challenging as the original arcade game! 32K, one joystick required.

Tape $21.95 **Disk $24.95**

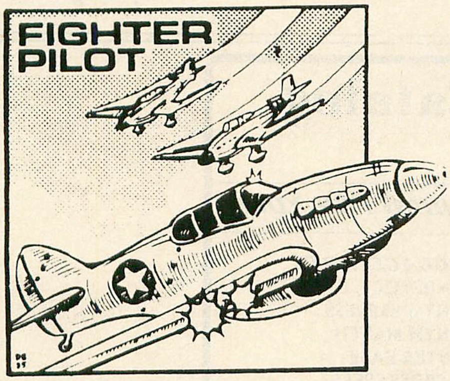


The Andrea CoCo

By Art Martin

Another great animated graphics adventure! All you came down to the Yacht Club for was to get a drink and maybe play a little poker. Heck, nobody would ever guess that the closest thing you owned to a real yacht was the one over your fireplace. It was in the bar that you heard rumors of earth-shattering events about to take place. You step out onto the wharf to get a little air when your natural curiosity and sense of adventure start to work...Can you save the world? Superb graphics, save & load feature. 64K, one disk drive required.

Disk $24.95



Fighter Pilot

An original arcade game! Wave after wave of attacking aircraft attempt to shoot you down as you maneuver your fighter into the wild blue yonder, blasting enemy fighter, bombers, and paratroopers out of the sky. Joystick or keyboard operation, "pause game" feature. Disk version saves high scores. 32K, 100% Machine Language. See February '86 Rainbow for review.

Tape $21.95 **Disk $24.95**

Adventure In Mythology

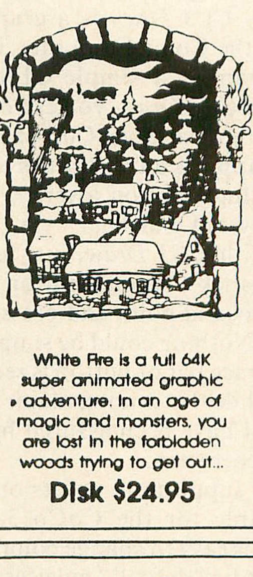
By Scott Cabit

An animated graphics adventure. Battle monsters and discover treasures as you assume the personalities of various heroes in ancient Greek mythology! You goal is to win the hand of the beautiful Atalanta, the swift-running huntress. But beware of the perils and obstacles that stand in your way as you journey through ancient Greece! Four-voice music and sound effects, automatic speech when using a Tandy SSC speech pak. Load and Save feature, over 250 locations. 64K Machine language.

Tape $21.95 **Disk $24.95**

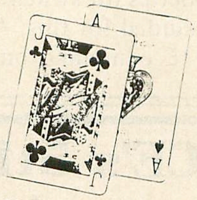
White Fire

Of Eternity



White Fire is a full 64K super animated graphic adventure. In an age of magic and monsters, you are lost in the forbidden woods trying to get out...

Disk $24.95



Blackjack Dealer Feeler Dealer

These two programs help you develop your Blackjack skill and strategy. In **Blackjack Dealer**, the computer deals the cards and plays the dealer's hand against you. **Feeler Dealer** enables you to test your strategy by playing the desired number of hands using your techniques & tendencies. A great teacher for new Blackjack players and a valuable tool for the veteran player. Both programs included. 32K extended

Tape $24.95 **Disk $29.95**

MAROONED!

By Steve [illegible]

Sitting on the back porch one fine afternoon you see a strange, flashing UFO-type object descend from the clouds & land in the corn field. Being the curious type, you run out to investigate and find a spaceship with its hatch open as you step inside, the hatch closes and the ship takes off! Now you must find a way to get back home. A great graphics adventure: 32K & one disk drive required

Disk or Amdek $29.95

*** * * GERMANY HERE WE COME * * ***

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An easy-to-use screen dump utility for Epson, Panasonic, Gemini, and compatible printers. Three sizes of printouts, double-strike option, reverse printing switch use of double-density, bit-image mode, allows you to view the graphics screen before printing. 16K, supplied on tape. Disk transferable.

Tape $14.95

CGP-220 Screen Dump

A graphics screen dump utility for the CGP-220 Ink Jet Printer. Features include: Fast machine language, four-color and one-color versions, special CoCo Max version, user-selectable colors, regular or double-size printout. 16K.

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Pretty Pictures on the CoCo 3 With *CC3 Draw*

At last, a package that utilizes the power of the new CoCo 3 has arrived. *CC3 Draw* is a graphics editor designed to operate with the Color Computer 3's enhanced graphics.

This program is a simple editor with several special features. With *CC3 Draw*, you can draw lines, boxes, circles, filled boxes or just set dots. Cursor control is with a joystick. *CC3 Draw* supports a two-button joystick; however, if you only have a single-button joystick, the space bar works as the second joystick button.

To draw with *CC3 Draw*, just set a point on the screen using the joystick's second button or the space bar. Then move to the second point and press the appropriate key for the function. Nothing could be simpler. Sometimes a second press of the space bar or button is required for proper setting of a point. While this is not a major problem, it is somewhat bothersome. I have been assured by the programmers that this is being corrected.

CC3 Draw supports 16 colors on the 320-by-192 Hi-Res screen available for the CoCo 3. All color choices are supported. It is easy to change colors, and *CC3 Draw* allows the user to set up "default" palettes for switching color sets. Complete instructions are included for this. Also included is a discussion of the `PALETTE` command on the CoCo 3 and how it works. This is handy because the `PALETTE` command and other associated color-control commands on the Color Computer 3 are somewhat difficult to understand.

CC3 Draw is by no means a replacement for *CoCo Max*. It is a starting point for CoCo 3 software. It does not have fancy icons or close-up editing capabilities. It does offer basic drawing functions for new owners of the CoCo 3. In addition, *CC3 Draw* offers something to the programmer as well.

The program is written entirely in BASIC. Because of this, those who know BASIC will be able to add their own commands and icons. The program is well-commented for these people. Also, several useful routines can be found in the BASIC listing. Among these is a method for saving the Hi-Res screen. This is something the CoCo 3 does not normally allow. If nothing else, *CC3 Draw* gives several examples of how to use the new features of the CoCo 3. However, I believe you'll want to draw a few pictures, too.

CC3 Draw includes five single-spaced pages of documentation covering nearly every aspect of the program. I found this to be helpful.

While I cannot give *CC3 Draw* a super-high rating, it does have some features that make it very worthwhile. I give the program a 75 on a 100-point scale. The documentation, however, gets a score of 90 on the same scale.

(Spectrum Projects, Inc., P.O. Box 264, Howard Beach, FL 11414; 718-835-1344, $19.95 plus $3 S/H)

— Cray Augsburg

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THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters.* So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

> *...one of the best programs for the Color Computer I have seen...*
> — Color Computer News, Jan. 1982

TELEWRITER-64

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

64K COMPATIBLE

Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, *all on the screen at one time.* Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

RAINBOW
CERTIFICATION
SEAL

File and I/O Features: ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette auto-retry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

> *...truly a state of the art word processor... outstanding in every respect.*
> — The RAINBOW, Jan. 1982

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RAINBOW

Give us your best: Join the ranks of these courageous CoCoists in showing the Color Computer world your high score at your favorite micro-diversion. We want to put your best effort on record in THE RAINBOW's "Scoreboard" column. All entries must be received 60 days prior to publication. Entries should be printed — **legibly** — and must include your *full* name, address, game title, company name and, of course, your high score. Each individual is limited to three score entries per month. Send your entries to Scoreboard, c/o THE RAINBOW. The "Rainbow Scoreboard" is now a bimonthly feature.

For greater convenience, your high scores may also be sent to us through the MAIL section of our new Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type `SEND` and address to: `EDITORS`.

★ Current Record Holder ● Shutout

ADVANCED STAR*TRENCH (THE RAINBOW, 7/86)	
3,960	★Maurice MacGarvey, Dawson Creek, British Columbia
2,300	Blain Jamieson, Kingston, Ontario
1,800	Chris Goodman, Baltimore, MD
ALPINE SLOPES (THE RAINBOW, 12/85)	
6,851	★Myriam Ferland, Trois-Rivieres, Quebec
4,656	Maurice MacGarvey, Dawson Creek, British Columbia
4,254	Todd Wirtz, Midland, MI
4,058	Johnny Garrison, Tuscaloosa, AL
3,970	Steven Bullard, Allen, OK
ANDRONE *(Radio Shack)*	
61,200	★Maurice MacGarvey, Dawson Creek, British Columbia
58,200	Scott Bellman, Bettendorf, IA
57,300	Mitch Hart, Seattle, WA
54,300	Daphnie Phillips, Evansville, WI
40,585	Theresa Juetten, Pelkie, MI
ASTRO BLAST *(Mark Data)*	
60,825	★Craig Schreder, Sarnia, Ontario
BAG-IT-MAN *(Aardvark)*	
358,000	★Kevin Krueger, 100 Mile House, British Columbia
BEAM RIDER *(Spectral Associates)*	
6,004,000	★James Oakley, Nashville, TN
3,376,080	Lisa Lapointe, La Tuque, Quebec
3,042,470	Evelyn Thompson, Nederland, TX
1,909,630	Paul Bivens, Washington, PA
747,200	Robert Eering, Swift Current, Saskatchewan
BIOSPHERE *(Radio Shack)*	
391	★Danny Perkins, Clifton Forge, VA
BOXING (THE RAINBOW, 8/86)	
480	★Talib Khan, Bronx, NY
395	Blain Jamieson, Kingston, Ontario
BUBBLE WARS (THE RAINBOW, 2/86)	
75,100	★Rachael Richards, Blakeslee, PA
43,150	Shirley Kirk, Elgin, OR
37,957	Odene Kirk, Elgin, OR
30,850	Daniel Cecil, Bardstown, KY
29,650	Carlton Taylor, Scarborough, Ontario
28,800	Jon Larson, Seligman, AZ
BUSTOUT *(Radio Shack)*	
37,900	★Gordon Rock, Davenport, IA
21,850	Charles Egglesfield, Sault Ste Marie, Ontario
21,630	Tanya Maestas, Denver, CO
21,236	Mike McCafferty, Idaho Falls, ID
18,403	Chris Zepka, North Adams, MA
1,266	Andy Walker, York, PA
CASTLE (THE RAINBOW, 6/86)	
202,659	★Brendan Powell, La Grande, OR
10,216	Kirby Smith, York, PA
9,941	Maurice MacGarvey, Dawson Creek, British Columbia
CATERPILLAR CAVE *(T&D Software)*	
1,170	★Alex Abraham, Atlanta, GA
CLOWNS & BALLOONS *(Radio Shack)*	
62,440	★Robin Ackerman, Concord, TN
41,280	Blake Cadmus, Reading, PA
COLOR BASEBALL *(Radio Shack)*	
999-0	★●Erik Munson, Tucson, AZ
866-1	Ghislain Chillis, Trois-Rivieres, Quebec
814-1	Frank D'Amato, Brooklyn, NY
814-0	●John Licata, Richton Park, IL
653-0	●Danny Perkins, Clifton Forge, VA
549-0	●Skipper Taday, East Lyme, CT
200-3	Martin Parada, Arcadia, CA
143-3	Steven Bullard, Allen, OK
141-0	●Maurice MacGarvey, Dawson Creek, British Columbia
101-2	Craig Mesler, Walkerville, MI
COLOR BLACKJACK (THE RAINBOW, 10/83)	
$26,500	★Francois Provencal, Chateauguay, Quebec
COLOR CAR *(NOVASOFT)*	
242,767	★Alan Martin, Cornwall, Ontario
110,454	Scott Enman, Belle-Mead, NJ
107,864	David Entenmann, Monroe, NY
CRYSTLE CASTLES *(ThunderVision)*	
820,010	★J. Yosef Krinsky, Jerusalem, Israel
DALLAS QUEST *(Radio Shack)*	
87	★Douglas Bell, Duncan, OK
89	Milan Parekh, Fullerton, CA
89	Andrew Urquhart, Metairie, LA
89	Steve Zemaitis, Howell, MI
90	Roy Grant, Toledo, OH
91	John Semonin, Akron, OH
92	David & Shirley Johnson, Leicester, NC
DEATH TRAP *(Soft Sector)*	
86,748	★Douglas Pardon, Brigham City, UT
47,233	Dale Krueger, Maple Ridge, British Columbia
40,674	David Entenmann, Monroe, NY
DECATHALON *(Spectral Associates)*	
10,304	★Bernard Florence, Croydon, Australia
9,648	Matthew Sunderland, Christchurch, New Zealand
9,344	Marco Lecours, Ste-Justine, Quebec
DEMOLITION DERBY *(Radio Shack)*	
110,500	★Tim Glenn, Havertown, PA
97,700	Brian Ballew, Morganton, NC
DEMON ATTACK *(Imagic)*	
244,110	★Gregory Day, Holstein, Ontario
125,520	Mike Watson, Northville, NY
81,635	Tim Glenn, Havertown, PA
78,010	Lisa Nebel, Phoenix, AZ
64,195	Jon Ruhnow, Duncanville, TX
DEMON SEED *(MichTron)*	
15,360	★Blake Cadmus, Reading, PA
DESERT PATROL *(Arcade Animation)*	
746,450	★Rodney Abery, Victoria, Australia
DESERT RIDER *(Radio Shack)*	
68,872	★Janine Freamon, Citrus Heights, CA
65,215	Skip Freamon, Citrus Heights, CA
62,329	Steve Zemaitis, Howell, MI
51,519	Michael Lizardy, Oregon, OH
50,268	Bernard Florence, Croydon, Australia
DOODLEBUG *(Computerware)*	
2,515,940	★William Novobilsky, Lanoka Harbor, NJ
1,315,170	Doreen Watt, Sudbury, Ontario
52,430	Craig Schreder, Sarnia, Ontario
18,385	Blake Cadmus, Reading, PA
DOUBLE BACK *(Radio Shack)*	
2,586,300	★Eugene Roosa, Stone Ridge, NY
1,618,400	Diane Guernon, Montreal, Quebec
450,600	Michael Brennan, Calgary, Alberta
159,610	Blake Cadmus, Reading, PA
52,840	Joel MacNeil, Needham, MA
DOWNLAND *(Radio Shack)*	
89,490	★Neil Edge, Williston, FL
70,142	Chris Goodman, Baltimore, MD
68,142	Cooper Valentin, Vavenby, British Columbia
49,500	Danny Perkins, Clifton Forge, VA
46,804	Theresa Juetten, Pelkie, MI
43,485	Jon Kirkham, Stratford, CT
38,696	Chuck Lehotsky, North Jackson, OH
DRACONIAN *(Tom Mix)*	
760,549	★Conan Davis, London, Ontario
DRAGON FIRE *(Radio Shack)*	
123,120	★Rupert Young, Sheffield, MA
46,713	Gilles Gagne, Sillery, Quebec
33,676	Nathanael Heller, Kenner, LA
30,720	Brian Matherne, Gretna, LA
21,221	Jermaine Jackson, Tallulah, LA
19,986	Owen Edson, Sherman Oaks, CA
18,529	James Nahas, New London, CT
15,260	Ed Emelett, Nanticoke, PA
ENCHANTER *(Infocom)*	
400/621	★Brad Wilson, Lithia Springs, GA
185/186	David Tarleton, Williamsburg, VA
80/115	Scott Bellman, Bettendorf, IA
EVICTOR (THE RAINBOW, 7/86)	
9,230	★Raymond MacGarvey, Dawson Creek, British Columbia
7,500	Rachael Richards, Blakeslee, PA
4,570	Chris Goodman, Baltimore, MD
FALCON'S LAIR (THE RAINBOW, 8/85)	
30,522	★Kirby Smith, York, PA
19,554	Talib Khan, Bronx, NY
18,461	Joyce Smith, Butler, PA
17,463	Michael Scott, Johnstown, NY
15,707	Daniel Cecil, Bardstown, KY
FIGHTER PILOT *(Saguaro Software)*	
117,000	★Stevphan Arvay, St. Louis, MO
61,500	Steven Arvay, St. Louis, MO
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73,520	★Neil Edge, Williston, FL
71,220	Debora Edwards, Wembley, Alberta
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628,020	Mike Dyer, Lompoc, CA
243,810	Jay Graddick, Cocoa, FL
73,460	John Straiton, Merritt Island, FL
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GHANA BWANA *(Radio Shack)*	
693,830	★Steve Wright, Fredericton, New Brunswick
510,160	Milan Parekh, Fullerton, CA
459,930	Gene Wells, Silsbee, TX
359,080	Mike Dyer, Lompoc, CA
325,900	Rupert Young, Sheffield, MA
GHOST GOBBLER *(Spectral Associates)*	
102,540	★Greg Erickson, Lowell, MA
80,550	Olga Pichard, Lausanne, Switzerland
76,900	Ghislain Chillis, Trois-Rivieres, Quebec
76,900	Pierre Pichard, Lausanne, Switzerland
72,960	Sylvain Castonguay, Chicoutimi, Quebec
47,200	Mark Herpst, San Diego, CA
37,200	Jason Maxwell, Manchester, TN
14,750	Bobby Brooks, Zephyrhills, PA
GRABBER *(Tom Mix)*	
23,550	★Rod Kruetzfeld, Vanscoy, Saskatchewan
GRID FACTOR *(T&D Software)*	
4,550	★Alex Abraham, Atlanta, GA

SCOREBOARD

HITCHHIKER'S GUIDE TO THE GALAXY *(Infocom)*

400/722	★Brad Wilson, Lithia Springs, GA

JUNIOR'S REVENGE *(Computerware)*

1,210,400	★Ryan Sharp, Pompano Beach, FL

KAMAKAZIE KAR (THE RAINBOW, 8/85)

75.75	★Tim Glenn, Havertown, PA

KARATE *(Diecom Products)*

24,400	★Robbie Cross, Starkville, MS
11,000	Gilles Melanson, Sudbury, Ontario
10,900	Jim Doyle, Barrackville, WV
9,900	Scott Enman, Belle-Mead, NJ
4,200	Scott Bellman, Bettendorf, IA

THE KING *(Tom Mix)*

4,092,600	★Fruber Malcom, Culpeper, VA
2,134,600	Tim Rueb, Stevensville, MI
1,670,900	Yolanda Farr, Sayre, PA
1,500,800	Kevin Cornell, Greentown, IN
219,700	Rodney Abery, Victoria, Australia
187,400	Craig Whitten, Oreana, IL
10,600	Bobby Brooks, Zephyrhills, FL

KNOCK OUT *(Diecom Products)*

181,085	★Rush Caley, Port Orchard, WA
168,385	John Licata, Richton Park, IL
149,190	Daniel Lesage, Laval, Quebec
137,900	John Rogers, Rye, NH
135,825	Ghislain Chillis, Trois-Rivieres, Quebec

LEMANS *(Spectral Associates)*

0:93	★Stephen Mills, Swift Current, Saskatchewan

LUNAR-ROVER PATROL *(Spectral Associates)*

403,950	★Rodney Abery, Victoria, Australia
142,600	Jerry Rossano, Manassas, VA

MARBLE MAZE *(Diecom Products)*

36,354,780	★Melvin Sharp Jr., Baltimore, MD
186,560	Neil Edge, Williston, FL
106,950	Dan Bouges, Niantic, CT
104,130	Jeff Maxwell, Lincoln, NE
103,560	Stephane Ouzilleau, Lauzon, Quebec

MEGA-BUG *(Radio Shack)*

20,941	★Shelby Dunning, Sacramento, CA
18,874	Tim Rueb, Stevensville, MI
17,250	Keith Queen, Marietta, GA
14,861	Michael Clerico, Seaford, NY
14,785	Blain Jamieson, Kingston, Ontario
5,612	Luis Mejico, Cordoba, Argentina

MISSION: F-16 ASSAULT *(Diecom Products)*

127,550	★Michael Heitz, Chicago, IL
34,670	Chris Foster, Texarkana, TX
29,600	Jeanine Mason, Spencer, MA
19,900	Stevphan Arvay, St. Louis, MO
14,900	Paul Mason, Spencer, MA

MR. DIG *(Computerware)*

10,416,315	★Paula James, Lumberton, TX

MUDPIES *(MichTron)*

354,800	★Sal Scibetta, Houston, TX
246,600	Terry Kreller, Winnipeg, Manitoba
127,200	Lisa Kohn, Canton, OH
108,800	Eddie Roginski, Mertztown, PA
96,700	Dale Krueger, Maple Ridge, British Columbia

NINJA WARRIOR *(Programmer's Guild)*

1,011,900	★Vivian Buterin, St. John, MO
753,000	Rich Fiore, Clemson, SC
181,200	Robert Mercredi, Winnipeg, Manitoba
164,400	Terry Kreller, Winnipeg, Manitoba
108,000	Eric Gladstone, Ocala, FL

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994-28	Chad Johnson, Little Rock, AR
986-22	Toby Jacobs, Bellefontaine, OH
970-32	Wes Hill, Vashon, WA
969-0	•Erik Huffman, Rochester Hills, MI

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33,320	★Blain Jamieson, Kingston, Ontario
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200,305	Michael Heitz, Chicago, IL
106,000	Martin Parada, Arcadia, CA
98,200	Jeanine Mason, Spencer, MA

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109,800	Mike Dyer, Lompoc, CA
63,890	Milan Parekh, Fullerton, CA
50,200	Rodrigo Maldonado, Whittier, CA

PITFALL II *(Activision)*

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194,000	Michael Wallace, Bronx, NY
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170,248	Donald Williams, Prince George, British Columbia
142,152	Don Lyman, Seattle, WA

PITSTOP II *(Epyx)*

54	★James Doty, Washougal, WA
54	★Danny Perkins, Clifton Forge, VA
15	Randy Heckman, La Mirada, CA
9	Walter Hearne, Pensacola, FL
9	Jeff Maxwell, Lincoln, NE

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12	★Chris Goodman, Baltimore, MD

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97,500,000	★Rich Fiore, Clemson, SC
3,785,000	Ben Collins, Clemson, SC
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1,546,000	Jason Maxwell, Manchester, TN
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— Debbie Hartley

SCOREBOARD POINTERS

In conjunction with THE RAINBOW's Scoreboard, we offer this column of pointers for our game-playing readers' benefit. If you have some interesting hints and tips, we encourage you to share them by sending them to the Scoreboard, c/o THE RAINBOW.

FEEDBACK

Scoreboard:

In response to Dale Lampe's question about *Pyramid* (August 1986), to get out of the maze after you are at the vending machine, you must go north, west and then up.

In the game *Raaka-Tu* I need to know how to get to the goblin and how to kill it.

Avi Finkel
Lewisburg, PA

Scoreboard:

In response to Rodrigo Maldonado's letter (October 1986) about *Pitfall II*, when you get down to the bottom of the caverns, go left as far as possible on land. Wait for the bat to fly over and, after a second, a balloon will appear. Go to the left side of the screen and avoid the bats. When you get to the top, the balloon will pop. Make sure you're over the land part. Go left, jump the scorpion, go up and you'll find the girl. Go down to the second scorpion from the top and then go left. Run and jump off the side, and keep going left to get the ring. The rest is up to you.

I need help in defeating the Wizard's image in *Dungeons of Daggorath*. I've mastered everything but him so far, and he doesn't fall for any tricks. Send help to the "Scoreboard."

Danny Perkins
Clifton Forge, VA

Scoreboard:

In conjunction with Dawn Daniels' letter in the October 1986 "Scoreboard" on how to get the coin in *Raaka-Tu*, using the "wait" command allows you to wait for the guards to pass and then approach the temple and get the coin (without getting killed). Be sure to move away immediately after getting the coin or the guards will return and kill you.

I've been going CoCo crazy trying to kill the image of the Wizard in *Dungeons of Daggorath*. Any help would be greatly appreciated.

Andy Wolstromer
River Edge, NJ

Editor's Note: Danny and Andy, you both might refer to the letter entitled "Rings are Good for the Image," which appeared in the March 1986 "Scoreboard."

GAME QUEST

Scoreboard:

I am seeking information about a company called Programmer's Guild. They make a game called *Ninja Warrior*, which is shown in the "Scoreboard." I would like to know if anyone has their address or telephone number.

Keith DuBose
Sarasota, FL

Editor's Note: Programmer's Guild is no longer in business, Keith, and we could not find any company that sells their game. We have had numerous requests for this game recently, so if anyone knows of a software company that carries *Ninja Warrior*, please write to the "Scoreboard."

GREEDY CREATURES

Scoreboard:

I have some hints for *Dungeons of Daggorath*. If you have a lot of objects you don't need, drop them. You can then stay in that same cell and no creatures (except the scorpion and the Wizard) may attack you until they are finished collecting the objects. While they are picking them up, you can attack them as much as you want, but watch out for your heart rate.

Michael Wallace
Bronx, NY

A-MAZE-ING RESULTS

Scoreboard:

I have a few tips for *Madness and the Minotaur*. In the room with the strange colored walls, turn the lamp off and then examine everything.

To get the pack rat to give you a treasure, take the sapphire to it.

To find out what you need to get the spell book, when you first start the game go west, west, north and examine the pool. In this room you can also climb the ledge (if you have the rope), or you can get the flute and parchment, go to the room in the maze that plays music, and play the flute. Also in the maze, find the pit that changes location in each game and type `LOOK PIT`.

To open the crypt which has a passage leading down only, get the Power ring and open the crypt.

John Fulton
Boydton, VA

A LITTLE MARTIAN MUSIC

Scoreboard:

Here are some tips for *Pyramid 2000*. At the entrance to the pyramid, type `OPEN PANEL`. Be sure you have the lamp, bottle, food and scepter. Be sure to water the plant twice. To get out of the maze, go north, west and then up.

I need directions to the Mummy's Chest. I also need to know if the fallen block can be moved. If so, how?

In *Mars-80*, to get more oxygen go into the ship. To catch the martian, play your harmonica (look in your suit) until he comes in the room. Make sure you have the net. Then type, `NET MARTIAN`. This will prevent him from moving everything around.

Sherry Moore
Columbus, OH

PLAYING IT SAFE

Scoreboard:

Here are a couple hints for *Paper Route*. Riding your bike in the middle of the street is much safer than the sidewalk; if you miss a few houses in the beginning, don't panic — this makes it easier to get perfect deliveries later.

I need help with *Trekboer*. How can I find the coordinates of the planet Alton, and is this the planet where I will find the Xendos? Also, how can I open the access panel in the environmental control room? Any help would be appreciated.

Michael Heitz
Chicago, IL

IMMUNITY

Scoreboard:

In the second board (Indian Hill) of *Canyon Climber*, if you go up the first ladder and then come back down, the arrows will no longer be able to kill you. This allows you to get points by jumping them without endangering yourself.

I need help with *Pyramid 2000* (What do you do about the mummy?) and *Raaka-Tu* (What do you do after you've gained 25 points?).

Any other help with those games would be appreciated also.

Matt Kurtin
Roanoke, VA

BURIED ALIVE

Scoreboard:

Here are some hints for *War of the Worlds*. Mapping is very useful in Chapter 1, but in chapters 2 and 3 it won't help much. Remember that the priest is only human and everything he says is not always true. When the alien drone tells you Klandor is on the island, he doesn't mean the island near Talma.

I need some help with *The CoCo Zone* (RAINBOW, April 1986). I get the mask and bottle and get into the casket. Once I am buried, I try to drill a hole, but I get the response, "too dark." When I light the match to drill a hole, a draft of air extinguishes it. I understand that you should be able to see good enough to drill a hole if you have the flashlight, but where do you get it? I've searched all over the entire building. Any help would be greatly appreciated.

Joel De Young
Manson, Manitoba

A CATCH-ALL OF CLUES

Scoreboard:

To start, I would like to give some hints on the game *Zork I*. To open the dam, you must go to the maintenance room and get the wrench. After you have the wrench, go to the controls and use it to turn the bolt. Wait awhile before going to the reservoir. You will now have a north direction to follow.

For the game *Enchanter*, try sleeping in the four poster bed and when you get up, examine the bedpost. Also, to get the jewel box open, drop all your items outside the gallery. In the gallery you will find the Ozmoo spell. Then, go outside the gallery and make your way to outside the temple. Drop all your inventory, cast the spell on yourself and go inside.

In the game *Hitchhiker's Guide to the Galaxy*, cover the hole in the vagon hold wall with your gown and cover the grating with the towel. I know how to get past the first two objects, but what do you do with the robot panel? Any help would be appreciated.

David Beyer
Melbourne, FL

BRINGING ORDER TO BEDLAM

Scoreboard:

I have solved *Bedlam* several times and there are two key points. 1) You must get the green key out of the Shock Room by standing in the room before it. 2) Get the hamburger out of the refrigerator, put the blue pill in it and feed it to the dog.

I would like help in solving *Madness and the Minotaur*. I can't seem to get any points at all, or kill monsters. Why?

Maurice MacGarvey
Dawson Creek, British Columbia

HOPING FOR *HALL* HINTS

Scoreboard:

I need some help, but also have a few tips, in the game *Hall of the King*. I need help in finding the stick and also need to know how to pry open the gate with the funny lettering above it.

Does anyone know how to bend the bar?

The tips I have may be useful to some people. Put the amulet on the hook (the amulet is found in the seats in the theatre), and the gate that is in the room with the two statues and the gem, will open. When you get to the shrine with the bowl and the rod on his head, pull the rod.

While in the room with the statue, box and pole, put the coins in the box. The rest is up to you.

Mark Bourdeaux
Spring Arbor, MI

To respond to other readers' inquiries and requests for assistance, reply to "Scoreboard Pointers," c/o THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We will immediately forward your letter to the original respondent and, just as importantly, we'll share your reply with all "Scoreboard" readers in an upcoming issue.

For greater convenience, "Scoreboard Pointers" and requests for assistance may also be sent to us through the MAIL section of our new Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type `SEND` and address to: `EDITORS`. Be sure to include your complete name and address.

— Debbie Hartley

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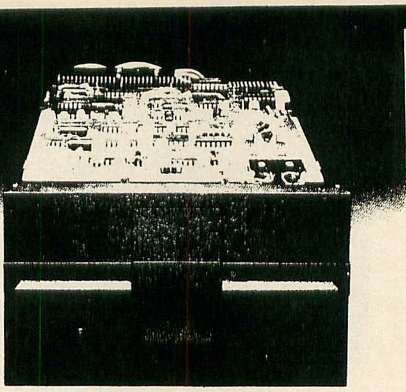

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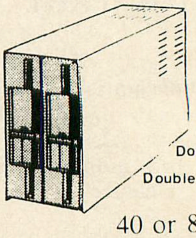

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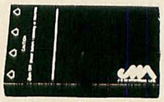

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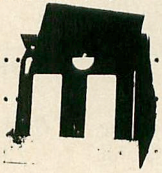

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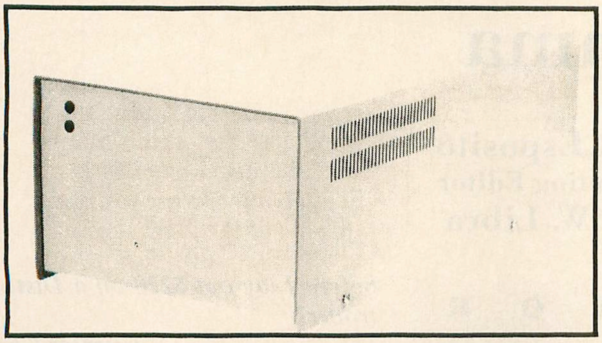

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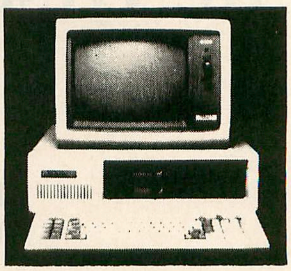

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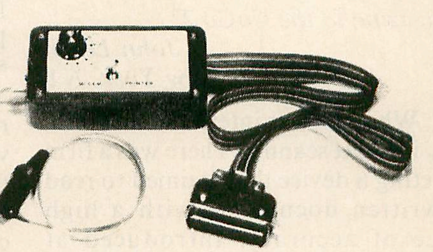

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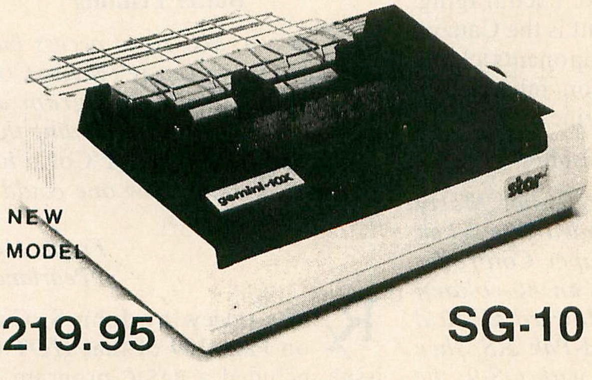

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The Disappearing PCOPY Dilemma

By Richard E. Esposito
Rainbow Contributing Editor
with Richard W. Libra

Whenever I `PCOPY 1` *to* `5`*, I get a syntax error and everything gets erased from memory. Is this a bug in one of my ROMs?*

Ernest Feo
Miramar, FL

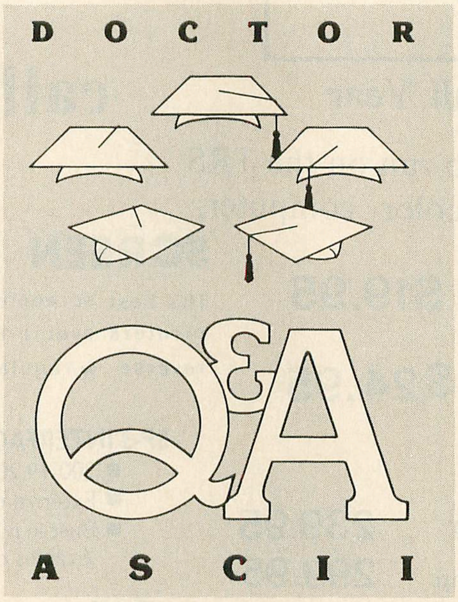
℞ To `PCOPY` higher than 4, Ernest, you must `PCLEAR` memory first. When you power up your Extended BASIC CoCo, BASIC reserves 6K bytes of screen memory starting at Address 1536 and continuing in 1,536-byte increments to 7679. Space above this area is used for your programs. Therefore, if you `PCOPY` into this area without clearing additional screen memory, you will get syntax errors and lose your program.

Bar Code for the CoCo

Does someone make a device like a light pen that can read data from a magazine to the CoCo 2?

John Leach
New York, NY

℞ What you are interested in, John, is a text scanner. There was a firm marketing a device that claimed to read typewritten documents with a high degree of accuracy. Introduced at $1,000 plus, it consisted of a frame that held an 8½-by-11-inch page and a trolley used to manually scan one line at a time. The product apparently has not been too successful, since I've seen it reduced to under $200. There have been attempts to put machine readable text in magazines, and RAINBOW's sister publication, PCM, has been printing portable computer software in bar code since April 1984.



RAINBOW once bound a phonograph recording of a CoCo tape into an anniversary issue. The most encouraging technology at the moment is the Cauzin SoftStrip, which its proponents claim can tolerate the variation inherent in mass producing a magazine.

80-Column Display

In the August 1986 issue, Marty Goodman recommended Word-Pak RS and the Disto Super Controller for those who desired an 80-column display. When I asked Howard Medical Computers about Word-Pak RS, they told me it only worked with OS-9; the Disto Controller is advertised to work with BASIC only if I rewrite some commands. Since I am not a programmer, can you give me programming hints on getting it to work with my software before I lay out $220 on a Disto Controller?

Guenter Glebinski
Union, NJ

℞ If you are looking for an 80-column display to work with your existing Color Computer software, Guenter, you are in for a big disappointment. Most standard CoCo software either uses high resolution graphics or the 32-by-16 text screen. FLEX and OS-9 software is usually written using these operating systems' standard display drivers, which can be patched to utilize a hardware 80-column display such as the ones sold by Disto or Howard Medical. PBJ, the manufacturer of Word-Pak, sold FLEX and BASIC drivers for earlier versions (Word-Pak I and II) of their Word-Pak RS. Cer-Comp and Elite Software market Word-Pak versions of their software. The 80-column display for the CoCo that has the most potential for non-OS-9 support is the one that comes standard on the new CoCo 3.

Buffer Printing

I use my MC-10 to access bulletin boards using Tandy's Micro Compac *communications program and a modem. It is my understanding that the June 1984 issue of* HOT CoCo *had an article explaining how one could print the buffer contents.*

Frank McCain
Pearland, TX

℞ The review by John S. Cullings on Page 109 of that *HOT CoCo* issue included a BASIC program *Compac Patch*, which patches the *Micro Compac* communications program to allow you to return to BASIC without destroying the text buffer. It also includes a BASIC program *Scan and Print*,

---

Richard Esposito is a project engineer for TRW's Government Systems Group. He holds bachelor's, master's and doctorate degrees from Polytechnic Institute of Brooklyn. He has been writing about microcomputers since 1980.

which allows you to print the text buffer from BASIC. Back issues and reprints of articles from *HOT CoCo* are available from CW Communications/Peterborough, Inc., 80 Pine Street, Peterborough, NH 03458, (603)924-9471.

Merging With Pokes

What pokes do I use to merge two programs using Extended Color BASIC?

B. Cohn
West Stockbridge, MA

℞ The following technique can be used to merge any number of BASIC programs as long as you do not exceed your CoCo's memory limit and the programs were saved in normal (non-ASCII) format:

1) Type `PRINT HEX$(PEEK(25)*256+PEEK(26))` and record the value.
2) `CLOAD` the first program.
3) Type `PRINT HEX$(PEEK(27)*256+PEEK(28)-2)` and again record the value.
4) Poke the values from Step 3 into addresses 25 and 26. (e.g., `POKE25,$H53:POKE26,&H41`)
5) `CLOAD` the next program and renumber if necessary to avoid line number conflicts.
6) Poke the values from Step 1 into addresses 25 and 26.

Note: You can repeat steps 2 through 6 to merge additional programs as long as you have sufficient memory. This technique also works with disk systems for programs that are not saved in ASCII.

Pondering an Upgrade

I have a 16K ECB CoCo, cassette, a DWP-210 printer and Color Scripsit. *I bought this setup a while ago and now since everything is much improved, should I upgrade or buy a new system? I am interested in using my computer for word processing, bookkeeping and telecommunications.*

Rosemarie Hoyt
Sharon, VT

℞ The lowest cost upgrade that will significantly enhance the capability of your CoCo would be to increase its memory to 64K RAM. With the RAM upgrade, the addition of one, or preferably two, double-sided disk drives would open the door to more professionally written home/office software. If your needs require an 80-column display and memory beyond 64K, then I would advise getting a new CoCo 3 instead of adding memory to your current machine. In any case, the drives will work even if you move up to a 3 later.

Program Interference

Is it possible that one program can interfere with another? I have a program, Gopher, *and it works fine unless I try to run it with* Diskmenu, *at which time I get an illegal function call.*

Robert LeBlanc
Bouctouche, New Brunswick

℞ The *Diskmenu* program performs a `PCLEAR 1` in Line 30. This eliminates most of the graphics memory that *Gopher* may require. Try removing this statement from Line 30 and see if that helps.

EDTASM Assembly

I recently purchased Tandy's Disk EDTASM *assembler. My question is how can I get the assembler source listings from* RAINBOW ON TAPE *to disk for processing with my assembler?*

W. Tudor Morris
Middletown, OH

℞ Assembler source listings are not included on RAINBOW ON TAPE. However, the program that follows will accomplish the task in other cases. It allows you to transfer ASCII files to disk and to number them if necessary for the *EDTASM* editor.

```
 10 DIM L$(80): L=0
 20 INPUT"TAPE FILENAME";FT$
 30 INPUT"DISK FILENAME";FD$
 40 OPEN"I",#-1,FT$: OPEN"O",
    #1,FD$
 50 INPUT"DOES FILE HAVE LINE
    NUMBERS?";Q$
 60 L=L+10: I$=STR$(L): LINE
     INPUT#-1,L$
 70 IF LEFT$(Q$,1)="Y" THEN
    PRINT#1;L$ ELSE PRINT#1,
    RIGHT$(I$,LEN(I$)-1);
    " ";L$
 80 IF EOF(-1)=0 THEN 60
 90 CLOSE#-1: CLOSE#1
100 REM END OF EDTASM
    TRANSFER
```

A Hard Disk Bargain

Is it possible to hook a hard disk to the CoCo at a reasonable price?

Jeff Miller
Midland, VA

℞ Since Tandy is currently marketing a hard disk controller, Catalog No. 26-3145 ($129.95), look for advertisers in RAINBOW to offer low-cost packages consisting of a drive, case, cable and power supply to support this "standard" controller.

Epson Dump

Where can I find a good, low-cost screen dump for my Epson RX-80 printer?

Russell Bolick
Middleburg Heights, OH

℞ *Versadump*, in *HOT CoCo* March 1985, is a screen dump generator that will build a machine language screen dump routine for your printer as well as many others. It was also part of the Instant CoCo tape for that month.

MicroMeltdown Problems

I am having difficulty entering the machine language portion of Micro-Meltdown, RAINBOW, *April 1983. I tried to write a poke routine. The first two lines which follow resulted in an ?LS Error.*

```
10 FOR X=&H0 TO &H0134:READ A$:
   POKEX,VAL("&H"+A$):NEXT X
20 DATA6D,8C,31,26,1B,6C,8C,
   2C,BE,01,6B,AF,8C,27
```

When I tried to assemble it, I got 193 errors. Is the program chock full of errors?

Teddy Kanamori
Pasadena, CA

℞ You're on the right track, but you are poking into BASIC's reserved area of memory and consequently blowing it away. The confusion arises from the "ORG 0000," which *EDTASM* interprets as Address $600 not $0000 as one might expect. The following loop will poke the proper code into memory in locations that will not interfere with BASIC, using data statements like the ones you are currently using. After saving the machine language version of this routine, be sure to subtract $600 from the offset value calculation mentioned in the article.

```
10 FOR X=&H600 to &H94A: READ
   A$: POKEX,VAL("&H"+A$):
   NEXTX
```

When entering this code into *EDTASM+*, omit the Hex numbers in columns two and three. For example, the line:

```
0003 0000 6D8C31 START TST
 <TOGLE,PCR NOT 0
```

should be entered as:

```
0003 START TST <TOGLE,PCR NOT 0
```

Colorful Text

I would like to know if there is a poke that changes the border of the screen to a different color. Also, can the text be changed to a different color?

Karl Beyer
Marengo, IL

℞ See Tony DiStefano's "Turn of the Screw," RAINBOW, October 1986, Page 162, for the border color. Text can be displayed red on yellow or yellow on red using the command `SCREEN1,0`. This change is nullified by BASIC when your program terminates. This nullification can be aborted by poking various values into Address 359 decimal. Some cassette machines work with 16 and some disk machines with zero.

OS-9 System Disk Add-On

Can BASIC09 be put on the OS-9 system disk? I am new to OS-9 and would like to learn much more about this operating system.

Tim Hill
Woodstock, Ontario

℞ Boot up with a backed-up copy of your system disk and use the `DEL` command to eliminate routines that you will not likely use with BASIC09. Then simply use the `COPY` command to put BASIC09 in the /d0/CMDS directory. Dale Puckett's books on OS-9 and BASIC09 are just the ticket for a new OS-9 aficionado.

Disk Fix

I have a tape-to-disk program that allows me to use most, but not all, of my old tape programs with my new disk system. As a novice, how can I fix the routines that do not run or execute with my disk?

Carl Rexrode
Las Vegas, NV

℞ As far as BASIC programs are concerned, look for embedded machine language routines in the code. Disk BASIC puts your programs 2,048 bytes higher in memory and in many cases, it's just a matter of identifying addresses in the embedded routines and incrementing them by 2,048. Machine language programs are another story. If they have an auto-loader, it must be disabled first. Assuming no auto-loader, either address dependencies or pokes that affect the disk drive hardware can be the culprit. If the problem is only address-dependent, a program, *TAPEFIX*, was published in my column in *80 Micro*, June 1986. It disables Disk BASIC after loading an ML program into high memory, and then moves it down to its normal address space before executing it. If *TAPEFIX* fails and the vendor of the software has no upgrade policy, your only alternative would be to disassemble the code and fix it the hard way.

Nondestructive Putting

How can I put an object on the screen without destroying the portion underneath it?

Rox Lores
Ponce, PR

℞ Use `GET` to retrieve the portion of the screen where you will `PUT` an image and put it to a non-displayed page of screen memory for safekeeping. Later, when you want to remove your object, you can get the original background and put it back.

Mileage With a Light Pen

Can I use a light pen to aid in estimating mileage from a road map?

Virhe Lowe
Mio, MI

℞ A light pen is essentially a photocell that detects the absence or presence of light. It can give the illusion of writing on a CRT because the software driver quickly blinks each pixel on the screen so the computer can detect the switching on or off of the pixel to which the light pen is pointed. If the map is displayed on a CRT and the appropriate hardware and software is available, it is technically feasible.

Crack Proof?

For months now I have been using what I thought was a fail-safe protection called K-Lock. Just recently, a friend of mine found a way to search through the directory, find the password, match it, and pass through K-Lock *right to the directory by changing Line 380 to:*

```
380 DATA 166,128,177,18,134,
  38,80,129
```

Can this program be made unbreakable?

Ryan Haldeman
Dallas Center, IA

℞ There is no software protection scheme that cannot be broken. Some are more difficult than others, but it's a constant cat and mouse game. It appears that this time, the cat got the mouse.

The CoCo Print Shop

I have seen a program for other computers called Print Shop. *Is there anything like it for the CoCo?*

Steven Day
Dayton, OH

℞ The closest CoCo equivalent I have seen is *CoCo Max II*.

Atari Games for CoCo

Is there any way to run Atari 2600 video games on the CoCo?

Bobby King
McCrory, AR

℞ It would be difficult to get the Atari code running on the CoCo, Bobby. First of all, you would need to disassemble the ROMs and convert the 6502 code to 6809 code. Then you would need to rewrite the portions of the code that are hardware dependent. Yes, it's possible, but with Atari game consoles selling for $30 and less, it's not worth the effort.

Bank Switching

I have a 64K CoCo and I would like to have a program that allows me to use two 32K banks of memory. Where can I find one?

Mike Johnson
Jacksonville, FL

℞ An ML program that allows you to bank switch from BASIC was included in the article "The 80K Color Computer," *HOT CoCo*, June 1985.

A Transfer Vehicle

Having just traded to a Tandy 1000, how can I transfer my RAINBOW ON TAPE programs to my Tandy 1000?

Warren Dugger Jr.
Orange, TX

℞ You can transfer RS-232 to RS-232. This is done by saving all of the BASIC programs on the CoCo in ASCII form, then loading them into the upload buffer of a smart terminal program such as Cer-Comp's *Datapack II*. With a similar program such as *Crosstalk* on the 1000, you can then save the programs to an MS-DOS disk. The alternative is to save the programs in ASCII to a CoCo disk and then use a program such as Mark Data Product's *CoCo Util II* to make the transfer. Keep in mind, however, most programs will require heavy editing before they will run on the Tandy 1000 and some may not run at all.

Edit to Squeeze in a Little More

Sometimes when typing in a program from RAINBOW, *I find a program line is too long, e.g., the program* Oh! Canada, *September 1985, Page 124, had such a line.*

Florence Campeau
Coteau Landing, Quebec

℞ Sometimes, Florence, you can squeeze in a few extra characters using the editor even after you have reached the end of the line.

Old-time Games

Several years ago, before computers became so popular, there were two programs for the TRS-80 Model I known as Santa Paravia *and* Fiumaccio. *These were later released by Instant Software, but I've never seen them for the CoCo.*

Madison Farrell
Walterboro, SC

℞ Before the beginning of the video-game craze, Madison, game programs were mostly in the public domain and were written by programmers for mini-computers and mainframes for fun with no profit motive. Two books by David H. Ahl, *101 Basic Computer Games* and *More Basic Computer Games*, contain a collection of the best of these. Many of these games were customized for the TRS-80 Model I and subsequently showed up in Instant Software.

Fill in the Blank

I would like to have the computer display lines with blank fields and then have the user fill them in. Can you offer some hints as to how this might be done?

Keith March
Continental, OH

℞ The cursor position in the CoCo is stored in addresses 136 and 137 decimal. The normal text screen memory is in the range 1024 to 1535, the first 32 bytes corresponding to the first row; the next 32 bytes, the second row; etc. You can put your fixed text on the screen using `PRINT@` statements and then position the cursor for inputs by poking the addresses 136 and 137. For example, to position the cursor to the center of the second row and prompt for input to the variable `X`, the BASIC code would be:

```
100 POKE136,4:POKE137,48
110 INPUT X
```

Drivers Needed

Are there any graphics printer drivers marketed for non-Tandy printers which run under OS-9?

Paul French
Burlington, IA

℞ I do not know of any commercial packages, but one could easily be written using C or BASIC09.

Upgrade for MC-10 Not Practical

How far can I go with my 20K MC-10 in making it more like my dad's CoCo? I would like 64K, extended BASIC *and assembly language capability.*

Nicholas Petroff
N. Vancouver, British Columbia

℞ It is technically possible to expand the MC-10 to 64K. You could write an assembler in BASIC for it. Pete Stark, in his book *Kilobaud Klassroom*, includes one for the 6800 that is very similar to the MC-10's 6803. The CoCo and the MC-10 both use the same tape ML format so a 6803 assembler could run on the CoCo and create ML tapes for the MC-10. However, with 64K CoCos as cheap as they are now, it makes no economic sense to expand the hardware of your MC-10. Even upgrading a CoCo 1 or 2 is questionable in light of the price of the new CoCo 3.

Rainbow's the Answer

Where can I find in-depth information on upgrading my CoCo, particularly printers, DOSs and disk drives?

Howard Knickerbocker
Olalla, WA

℞ The most popular printers for CoCo owners are the Star Gemini series. If you buy drives, don't get the obsolete single-sided ones. Get double-sided drives. The ones made by TEAC have a good reputation for reliability. If you plan to use CoCo commercial software, get Radio Shack Disk Color BASIC 1.0 or 1.1 in ROM for disk controller, which supports single as well as double-density operation. You can get ADOS, BDOS, JDOS or some other ROM DOS, but use one of these as an alternate when you are writing your own code. For specific information on a particular product, check the reviews in RAINBOW. Since 1984, the July issues of the RAINBOW have included a comprehensive index of the previous year, which includes a reviews index.

Cross Assembling

Does anyone market a 6809 - 68008 cross-assembler? I am interested in moving CoCo source code to CIR-PAK Ltd.'s 68008 board for the CoCo.

Dennis Kakoske
Winnipeg, Manitoba

℞ Contact Frank Hogg Laboratory. They market a 6502-6809 translator and may be planning one for the 68008.

64K Runs 16K Programs

Will a 64K CoCo run programs designed for a 16K machine?

Michael Albert
Long Beach, NY

℞ A similarly configured CoCo with larger memory will run the programs of one with less memory unless there is a difference in the ROMs, and the program uses undocumented ROM calls. Incompatibilities do arise with disk versus non-disk CoCos primarily due to the use of the memory in the range $600 to $DFF, which is reserved for use by Disk BASIC.

The IRS Is Watching

Can the CoCo be used to prepare federal tax returns and will the IRS accept computer-generated forms from a DMP-130 printer?

David Sharp Jr.
Dover, PA

℞ There have been income tax preparation programs published in CoCo magazines and included in tape loaders such as *Chromasette*. None of those I have seen generated the tax forms, but they supplied the information. I do, however, know that the IRS does accept computer-generated forms. I suggest that you contact your local branch of the IRS or a tax attorney for regulations governing computer generated forms.

For a quicker response, your questions may also be posted in the Forum section of RAINBOW's CoCo SIG on Delphi. In Forum, type `ADD` and address your questions to the username DOCTORASCII. You may also send questions to DOCTORASCII via Delphi Mail

No more wasted electricity with this clever project

LED Power Indicator

By Logan Ward

As everyone knows, one of the problems with owning disk drives for the CoCo is that you can't tell if power is being supplied to the unit.

I am just as guilty as the next person. I will finish using *CoCo Max* or some other software, turn off my trusty CoCo and leave. Hours later I'll come back to my computer room, turn on my CoCo and reach around the back of the drives, only to find out that I failed to turn them off the last time. I do not know about other CoCo users, but electricity is costly these days and I feel the need to save all I can. Plus, I do not like power supplied to any of my units when they are not in use.

Enter the bi-color, power-on indicator. This modification allows you to use a tri-color LED in place of the existing red LED. Under normal conditions, with the power on, the LED will glow red or green, depending on what color you choose. During disk I/O, the LED will glow the opposite color, letting you know the drive is being accessed. After I/O is complete, the LED will return to its original color.

Logan Ward lives in Memphis, Tenn., and is studying electronics technology and computer engineering at the State Technical Institute. He is head technician and service manager at The Computer Center, and his hobbies include custom programming and creating pictures on CoCo Max.

One of the big advantages to this modification is that no holes need to be drilled in the drive face plate. Another plus is that the basic components can be bought at your local Radio Shack.

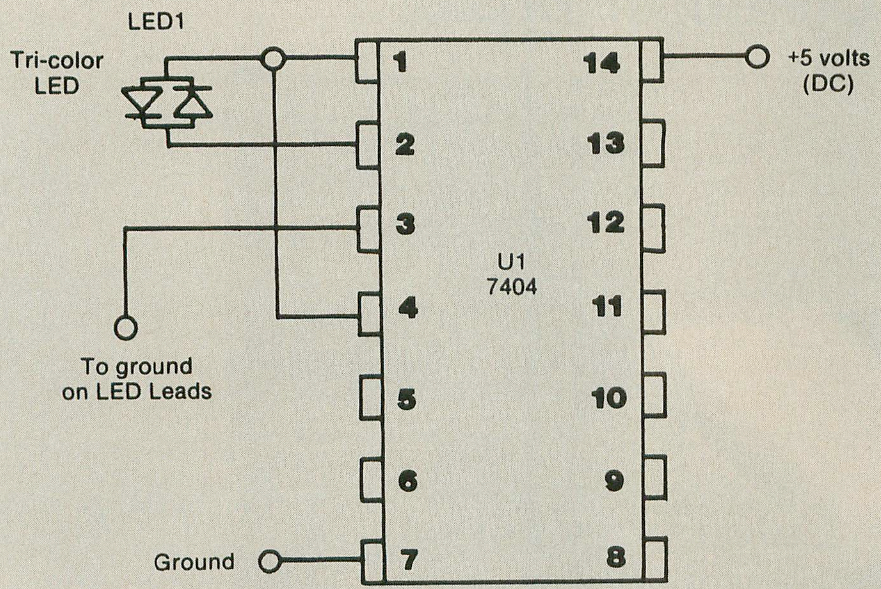
The first order of business is building the circuit (see Figure 1). The modification uses a 7404 Inverter and a tri-color LED (we will only use two colors). The inverter requires +5 volts to operate. This can be done a couple of ways. One is to tap 5 volts from the power connector on back of the drive to the chip mounted on perf board and stuck with double-stick tape to the drive or drive case.

The second method is piggybacking the chip to an existing chip on the drive motherboard with Pin 14 to 5 volts and Pin 7 to ground. Spread out the other legs so they do not touch the chip on the drive circuit board. Use a meter to find these voltages. Run two wires from pins 1 and 2 of the 7404 to the existing LED on your drive.

Take the tri-color LED and solder a long lead to the wire going to Pin 1 for a green power-on light and a red access light. To have a red power-on light and green access light, reverse LED pin connections. Next, remove the red LED from the face plate. How you do this is up to you. There are many different drives and many ways of removing the LED. Take it out as you see fit.

After removal of the LED, disconnect it from the leads attached to it. Take the positive lead and put a piece of electrical tape across the exposed

Figure 1: CoCo Disk Drive Power-on Indicator



Parts List
LED1 — Tri-color LED (RS # 276-035)
U1 — 7404 inverter (RS # 276-1802)
I0 — PERF Board (RS # 276-024)

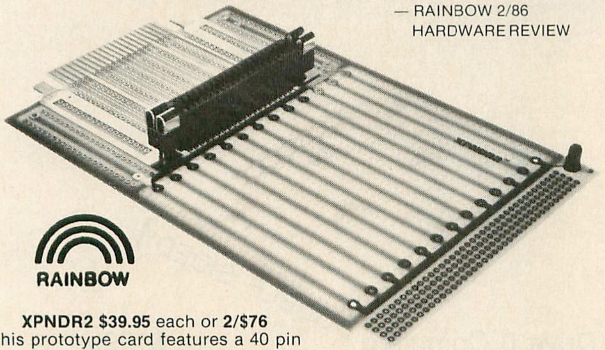
part of the wire. You will no longer need this. Now attach the ground lead wire from the old LED and solder it to Pin 3 of the 7404. When this is complete, solder a small wire from Pin 4 to Pin 1 of the 7404 inverter. Finally, remount your tri-color LED in the holder your original red LED was in. That's all there is to it. Some drives have the LED soldered into the circuit board. This project will work for those drives, but it will take a little extra work.

I have tried this modification on full-height TEAC, TEC, Shugart, Tandon, MPI and Texas Peripheral disk drives. It worked on all of them, with success in all cases.

The basic modification can be done for under $3 and in one evening. So get to work and enjoy. This modification has truly helped me and I know it will help you. If you have any questions, feel free to call me at the Computer Center (901-685-0009) from 9 a.m. to 5 p.m. CST.

I would like to thank Jesse Dunn, of the Memphis Color Computer Users Group for this idea, and my best friend, Ken Hunt, for a helpful suggestion. Happy computing!

"XPNDR2 and SuperGuide - an Ideal Expansion Card Set"
— RAINBOW 2/86 HARDWARE REVIEW



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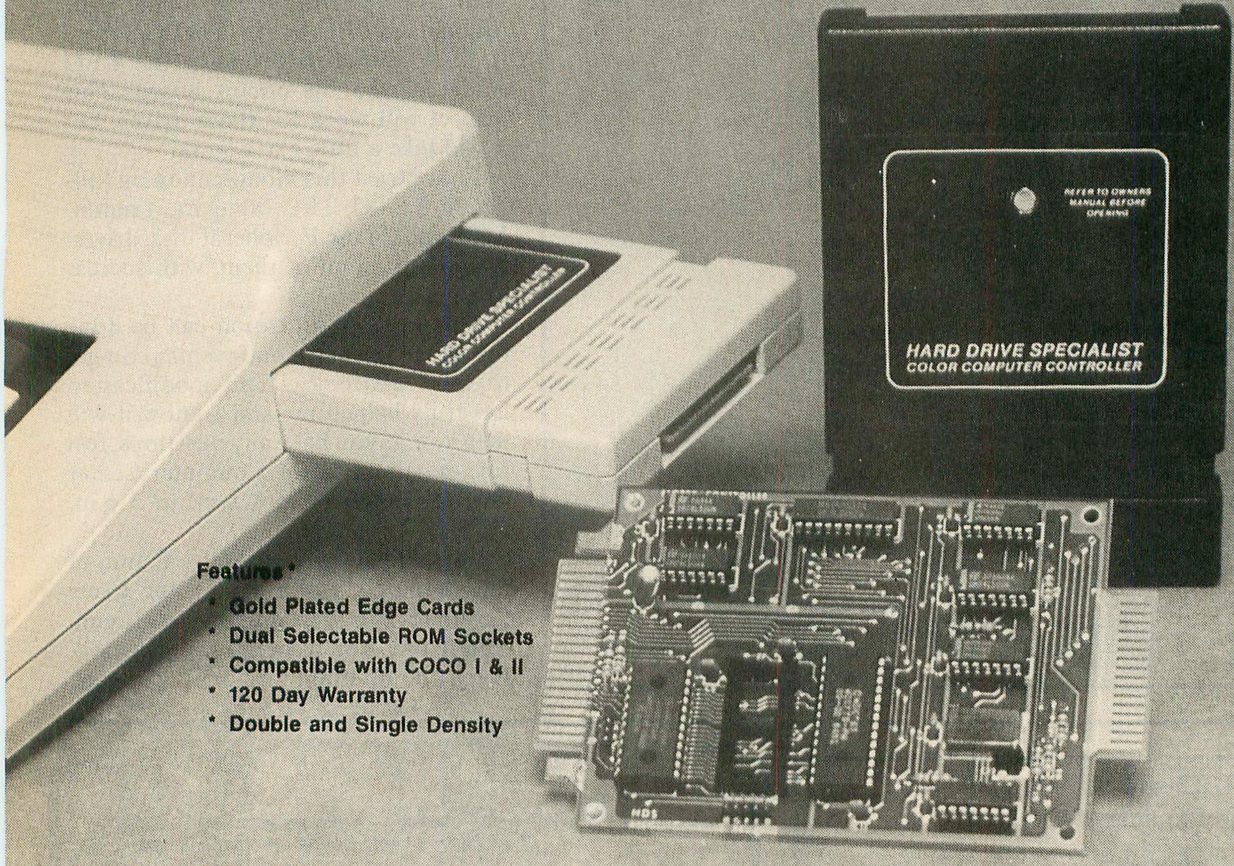
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16K ECB

Creating Designer Arcade Games

By Fred B. Scerbo
Rainbow Contributing Editor

Editor's Note: If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. *Remember, keep your ideas specific, and don't forget that this is* BASIC. *All programs resulting from your wishes are for your use, but remain the property of the author.*

The pages of THE RAINBOW have often served as the testing ground for graphics, subroutines, and full-blown games I have worked on during the last few years. Some of the earliest offerings were short 4K programs such as *Zelda's Bat Bottle* or *Alpine Aliens.*

One of the most popular games I have listed was in 1982: *Snail Invaders.* "Snail" was the nickname of one of my students who served as the inspiration for that game written entirely in BASIC. Since a BASIC *Invader* game could not match the speed of its machine language relatives, making the targets slow-moving snails more than justified the lack of speed. (In July of 1983, *Snail's* sequel, *Snail's Revenge* was also listed for RAINBOW readers. It even made the "Scoreboard," as readers submitted their high scores.)

Snail Invaders served as the later inspiration for a more refined version I released called *Creatavader.* The routines were slightly faster and a menu of assorted targets was added to allow the user to blast something that really bugged him, whether it be cats or those little "have a nice day" smiley faces. While it still could not match the speed of a machine language game, it was an interesting variation on the theme, and those who purchased copies told me they enjoyed it.

The Wish

Since then, some of you have written asking how to obtain copies of some of those out-of-print IMB games including *Creatavader* and *Snail Invaders.* While *Snail Invaders* could be obtained by ordering back issues of the magazine or RAINBOW ON TAPE, *Creatavader* has been totally unavailable, until now.

As my 1986 Happy Holidays gift to all my readers, now you can enjoy a vastly improved *Creatavader* (Version 2.0), which is not only a shorter listing than the original *Snail* (by about 1,700 bytes), but a much more efficient program as far as programming techniques are concerned.

Cleaning House

When I decided to rewrite *Creatavader*, the first step was to dump the old title card with the IMB logo. Using CoCo *Titlemaker* from several issues ago, I created a much more attractive title card which matches most of my recent programs.

However, as I started to analyze the listing, which was now over four years old, I was a little embarrassed to see how sloppy the structure of the program was. Quite honestly, I must have been `GOSUB` crazy, since I had weaved such a tangled web of subroutines it was a nightmare to unravel. In fact, I couldn't help but be reminded of comic Pee Wee Herman's line about trying to unravel a sweater ". . . that someone keeps knitting and knitting and knitting and knitting . . .!" I had knit some sweater with this listing!

The next change I made, after I found my place, was to rewrite the graphic

---

Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.

scoring display, which was quite crude in the original version. *Snail* had been written without using string arrays, so this time I incorporated a more efficient subroutine that also cut down on the number of `GOSUB`s. Subroutines are slower than straight programming since the CPU (Central Processing Unit) of your CoCo must set up a flag and pointer whenever a subroutine is called. By reducing the number of `GOSUB`s, the program would execute in much less time. Next, I went to the section of the program that would draw the boxes containing our graphics targets. Both *Snail* and *Createavader* listed every location and `IF-THEN` statement as a separate set of lines. This constituted 48 separate lines for the 24 graphics targets.

These lines were cut down to about four lines by inserting variables and using a set of nested `FOR-NEXT` loops. The end result would be that the program's speed increased dramatically by this one change.

The original versions of *Snail* and *Creatavader* also used a set of complicated `IF-THEN` statements at the end of the program to set up the explosion locations correctly if a target was hit. A short math formula using the `INT` function allowed me to eliminate this entire subroutine at the end of the program. An added side bonus also now allowed me to award different values of points based on the location of the target's height.

Add to this the rewrite of the scoring mechanism and the reduction in `GOSUB`s, and *Creatavader* (Version 2.0) runs more than twice as fast as its original version. Naturally, I could not help but add a few other refinements. I made the difficulty level a little tougher to compensate for the speed increase.

For example, sometimes a target will reappear after it has been blasted. Also, the phantom ship that takes shots at you is now much quicker and appears more often. The scoring mechanism will handle up to a 15-digit score, so forget trying to turn it over. You can't.

A major change that helped speed up the game was my change from `PMODE3` to `PMODE1`. The resolution between these two modes is not as dramatic as the difference between `PMODE4` and `PMODE1`, for example. Since in `PMODE1` only half as much graphics memory is used as in `PMODE3`, we also get a dramatic speed increase in BASIC.

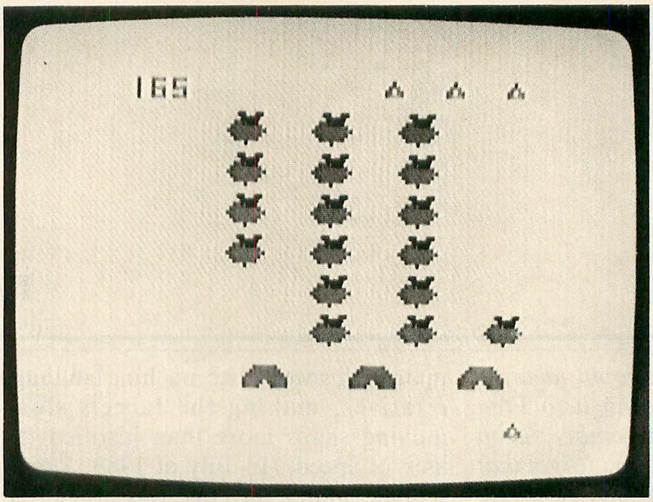
Another interesting change I added was the use of the `PCOPY` command. Since `PMODE1` uses only graphics pages 1 and 2, we do most of our animation on pages 3 and 4 and `PCOPY` them to 1 and 2. This eliminates the annoying ripple effect when the targets move across the screen. Now they march to the right in unison, rather than one at a time.

More Speed

If you want to get the maximum speed out of this program, add an extra line with the speed-up poke in Line 0:

```
0 POKE65495,0
```

Do this only when you have run the program without the poke and saved it. Some CoCos will not accept this poke with the disk drive plugged in, so be careful to save the program first, or `POKE65494,0` before attempting a save. This makes the program really zip along.



On running the game, you see the new title card. Pressing any key gives you the menu of choices. The targets you may choose are communist flags (years before *Rambo*), television sets (get even with junk programming), whales (if you don't want to save them), killer tomatoes, nuclear bombs (nuke the nukes), smiley faces (don't have a nice day), cats and Creatavader mode.

As you can see, there is something for everyone. After you select the target, the screen will clear and your game starts. You must use the right joystick and firebutton. Play the game just as you would any other invader-style game with these variations:

1) The targets do not shoot back, but a phantom ship will appear and take shots at you.

2) You cannot shoot and move at the same time.

3) Even if you blast all the targets to the right, you must clear all the targets before the last one on the left reaches the center. To have allowed it to go all the way to the right would require changes that would slow down the program too much.

4) Sometimes you may shoot through your shield without destroying them. Other times you cannot.

5) Once you clear the screen, the phantom ship may still shoot at you for awhile. Hide behind your shields!

When all your men are destroyed, you may restart the game by pressing the ENTER key. The program determines a blast when the point on the screen where your shot is going is tested for background color. Sometimes, you may just graze a target which has some background color in it. In this case, the target will not explode.

Creatavader Mode

You may make your own "designer" targets by selecting the Creatavader mode. You may use either a green or white background when you select this mode. After selecting the background color, you will see a small box that will hold your design. Use the arrow keys to move a dot around the screen to draw a target. At the bottom of the screen are four circles with available colors. Press numbers 1 through 4 according to their order to create a dot. Be sure to select other than the background color before you start drawing. Use the background color to erase any mistakes.

When you are finished drawing, press @ to start playing with your new target. If you use too much background color in your drawing, you may not hit your targets.

You may not save your creations, unfortunately. If you really must save your own creations, renumber the program using `RENUM` and kill one of my targets and create your own using `DRAW` and `PAINT` in the same lines.

Conclusion

I hope you enjoy this holiday gift. You should be able to pick up some programming ideas just from keying it

RAINBOW Info

How To Read Rainbow

Please note that all the BASIC program listings in THE RAINBOW are formatted for a 32-character screen — so they show up just as they do on your CoCo screen. One easy way to check on the accuracy of your typing is to compare what character "goes under" what. If the characters match — and your line endings come out the same — you have a pretty good way of knowing that your typing is accurate.

We also have "key boxes" to show you the *minimum* system a program needs. But, *do* read the text before you start typing.

Finally, the little cassette symbol on the table of contents and at the beginning of articles indicates that the program is available through our RAINBOW ON TAPE service. An order form for this service is on the insert card bound in the magazine.

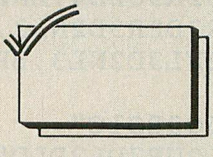
What's A CoCo?

CoCo is an affectionate name that was first given to the Tandy Color Computer by its many fans, users and owners.

However, when we use the term CoCo, we refer to both the Tandy Color Computer and the TDP System-100 Computer. It is easier than using both of the "given" names throughout THE RAINBOW.

In most cases, when a specific computer is mentioned, the application is for that specific computer. However, since the TDP System-100 and Tandy Color are, for all purposes, the same computer in a different case, these terms are almost always interchangeable.

The Rainbow Check Plus



The small box accompanying a program listing in THE RAINBOW is a "check sum" system, which is designed to help you type in programs accurately.

Rainbow Check PLUS counts the number and values of characters you type in. You can then compare the number you get to those printed in THE RAINBOW. On longer programs, some benchmark lines are given. When you reach the end of one of those lines with your typing, simply check to see if the numbers match.

To use *Rainbow Check PLUS,* type in the program and CSAVE it for later use, then type in the command RUN and press ENTER. Once the program has run, type NEW and press ENTER to remove it from the area where the program you're typing in will go.

Now, while keying in a listing from THE RAINBOW, whenever you press the down-arrow key, your CoCo gives the check sum based on the length and content of the program in memory. This is to check against the numbers printed in THE RAINBOW. If your number is different, check the listing carefully to be sure you typed in the correct BASIC program code. For more details on this helpful utility, refer to H. Allen Curtis' article on Page 21 of the February 1984 RAINBOW.

Since *Rainbow Check PLUS* counts spaces and punctuation, be sure to type in the listing exactly the way it's given in the magazine.

```
10 CLS:X=256*PEEK(35)+178
20 CLEAR 25,X-1
30 X=256*PEEK (35)+178
40 FOR Z=X TO X+77
50 READ Y:W=W+Y:PRINT Z,Y;W
60 POKE Z,Y:NEXT
70 IFW=7985THEN80ELSEPRINT
   "DATA ERROR":STOP
80 EXEC X:END
90 DATA 182, 1, 106, 167, 140, 60, 134
100 DATA 126, 183, 1, 106, 190, 1, 107
110 DATA 175, 140, 50, 48, 140, 4, 191
120 DATA 1, 107, 57, 129, 10, 38, 38
130 DATA 52, 22, 79, 158, 25, 230, 129
140 DATA 39, 12, 171, 128, 171, 128
150 DATA 230, 132, 38, 250, 48, 1, 32
160 DATA 240, 183, 2, 222, 48, 140, 14
170 DATA 159, 166, 166, 132, 28, 254
180 DATA 189, 173, 198, 53, 22, 126, 0
190 DATA 0, 135, 255, 134, 40, 55
200 DATA 51, 52, 41, 0
```

Using Machine Language

Machine language programs are one of the features of THE RAINBOW. There are a number of ways to "get" these programs into memory so you can operate them.

The easiest way is by using an editor/assembler, a program you can purchase from a number of sources.

An editor/assembler allows you to enter mnemonics into the CoCo and then have the editor/assembler assemble them into specific instructions that are understood by the 6809 chip, which controls your computer.

When using an editor/assembler, all you have to do, essentially, is copy the relevant instructions from THE RAINBOW'S listing into CoCo.

Another method of getting an assembly language listing into CoCo is called "hand assembly." As the name implies, you do the assembly by hand. This can *sometimes* cause problems when you have to set up an ORIGIN statement or an EQUATE. In short, you have to know something about assembly to hand-assemble some programs.

Use the following program if you wish to hand-assemble machine language listings:

```
10 CLEAR200,&H3F00:I=&H3F80
20 PRINT "ADDRESS:";HEX$(I);
30 INPUT "BYTE";B$
40 POKE I,VAL("&H"+B$)
50 I=I+1:GOTO 20
```

This program assumes you have a 16K CoCo. If you have 32K, change the &H3F00 in Line 10 to &H7F00 and change the value of I to &H7F80.

The Rainbow Seal

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The Rainbow Certification Seal is our way of helping you, the consumer. The purpose of the Seal is to certify to you that any product that carries the Seal has been physically seen by us, that it does, indeed, exist and that we have a sample copy here at THE RAINBOW.

Manufacturers of products — hardware, software and firmware — are encouraged by us to submit their products to THE RAINBOW for certification. We ascertain that their products are, in actuality, what they purport to be and, upon such determination, award a Seal.

The Seal, however, is not a "guarantee of satisfaction." The certification process is different from the review process. You are encouraged to read our reviews to determine whether the product is right for your needs.

There is absolutely no relationship between advertising in THE RAINBOW and the certification process. Certification is open and available to any product pertaining to CoCo. A Seal will be awarded to *any* commercial product, regardless of whether the firm advertises or not.

We will appreciate knowing of instances of violation of Seal use.

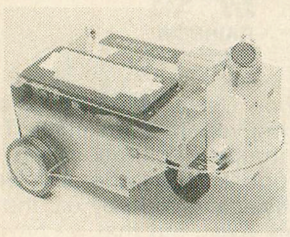
in. If nothing else, it will teach you to document your programs as you write them so you don't spend hours unraveling years later, as I had to.

Until next time, Season's Greetings and Happy New Year to you all! ☐

16	55
26	252
37	7
46	36
66	174
82	205
100	113
END	32

The listing: CRTVADER

```
1 '****************************
2 '* CREATAVADER  VERSION 2.0 *
3 '*      BY FRED B.SCERBO    *
4 '*       60 HARDING AVE     *
5 '*  NORTH ADAMS, MA. 01247  *
6 '*    COPYRIGHT (C) 1986    *
7 '****************************
8 CLEAR400:PLAY"V31P255"
9 CLS0:PRINTSTRING$(32,220);
10 FORI=1TO224:READA:PRINTCHR$(A
+128);:NEXT
11 DATA110,109,101,108,109,101,1
08,104,110,108,106,108,110,104,7
8,76,74,42,32,,37,37,44,45,37,45
,34,46,44,37,44,45
12 DATA106,,101,,101,101,,96,106
,,106,,106,,74,80,74,42,32,,37,3
7,32,37,37,32,42,42,32,37,,37
13 DATA106,,101,,101,101,,96,106
,,106,,106,,74,80,74,42,32,,37,3
7,32,37,37,32,42,42,32,37,,37
14 DATA106,,101,108,110,101,108,
96,110,108,106,,106,,78,76,74,45
,32,32,46,37,44,45,37,32,42,46,4
0,37,44,46
15 DATA106,,101,,106,101,96,96,1
06,,106,,106,,74,80,74,37,34,33,
42,37,32,37,37,32,42,42,32,37,,4
2
16 DATA106,97,101,,106,101,,96,1
06,,106,,106,,74,80,74,32,43,39,
32,37,32,37,37,33,42,42,32,37,,4
2
17 DATA108,108,100,,108,100,108,
104,104,,104,,104,96,72,80,72,80
,36,40,32,36,32,36,36,44,32,44,4
4,36,,44
18 PRINTSTRING$(32,220);
19 PRINT@326,"  BY FRED B.SCERBO
  ";:PRINT@358,"    VERSION  2.0
   ";:PRINT@390," COPYRIGHT (C)
 1986 ";
20 IFINKEY$=""THEN20
21 CLS0:SR=3:R=5:Z=110:R$=CHR$(1
28)
22 PMODE1,1:PCLS:SCREEN0,0:Q$="C
1BRNU4RU4RD4RU4RD4RU4RNL4D2NL4D2
L6C3"
23 DIMT(24),N$(9),A(15):FORI=0TO
9:READN$(I):NEXT
24 DATA BR2U4R3D4NL3,BR4NU4BR,BR
2U2R3U2NL3BD4NL3,BR2R3U2NL2U2NL3
BD4,BR2BU2NU2R3U2D4,BR2R3U2L3U2R
3BD4,BR2U4NR3D2R3D2NL3,BR2BU3UR3
D4,BR2U4R3D2NL3D2NL3,BR2BU2NR3U2
R3D4
25 QQ$="L255O2BO1C"
26 GB$="ULUL2UR7DL2DLD":CLS0:PRI
NT@38,"communist"+R$+"flags";:PR
INT@102,"television"+R$+"sets";:
PRINT@166,"whales";:PRINT@230,"k
iller"+R$+"tomatoes";:PRINT@294,
"nuclear"+R$+"bombs";:PRINT@358,
"smiley"+R$+"faces";
27 PRINT@422,"cats"+R$+"cats"+R$
+"cats";:PRINT@486,"creatavader"
+R$+"mode";
28 FORI=1TO8:POKE1058+LW,48+I:LW
```



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```
=LW+64:NEXTI
29 TR$=INKEY$:IFTR$>"8"THEN29
30 IFTR$<"1"THEN29
31 CLS0:TR=VAL(TR$):ON TR GOTO32
,34,35,37,38,39,40,42
32 LINE(26,28)-(48,42),PSET,BF
33 DRAW"S4BM30,41C2E3RF2R4E2NF4E
2U2H4L4BD4BRNE2NG2NF4":AC=1:SR=3
:R=1:GOTO65
34 COLOR7,6:LINE(26,28)-(48,42),
PSET,BF:LINE(30,31)-(41,39),PRES
ET,BF:COLOR8,5:LINE(44,31)-(46,3
4),PSET,BF:SR=3:R=5:GOTO65
35 DRAW"S6BM36,39C3L5H2U5HU2RNF3
RF2E2R2D2G3LD2R2REURERER6F2DGL3G
2R4NL11DL15"
36 PAINT(40,36),3,3:DRAW"S6BM36,
39C5BL4BU4NU5UC3R":PSET(40,36,8)
:AC=1:R=1:GOTO65
37 COLOR4,5:CIRCLE(38,36),11,,.7
:PAINT(40,36),4,4:DRAW"S4BM40,32
C2L2NH3R5E3LG2L4H2":SR=3:R=5:AC=
0:GOTO65
38 COLOR3,5:DRAW"S4BM40,42C3L7H2
NR17H2E4R13F4G4L6BM40,42BL7BH4BL
2C2NH3NG3L2NU2ND2":PAINT(40,38),
3,3:CIRCLE(40,34),6,4,.7:R=1:AC=
1:GOTO65
39 COLOR2,5:CIRCLE(38,36),11,,.9
:PAINT(38,36),2,2:DRAW"S4BM38,40
C7L2NH3R5NE3":FORI=0TO1:PSET(41,
34-I,3):PSET(36,34-I,3):NEXT:PSE
T(29,36,3):AC=1:R=1:GOTO65
40 DRAW"S4BM38,41C2BL7U2EU2H3U5R
12DL11D4E2R7F4U2EUF3RE3DFGL3DFR2
GL5H2D3FR2D2BL4H2U5G2L2H2D2FR2D4
":PAINT(38,34),2,2:PAINT(44,34),
2,2:PSET(44,34,3)
41 AC=1:R=1:GOTO65
42 GR=1:PRINT@104,"select"+R$+"c
olor"+R$+"mode";:PRINT@169,"whit
e"+R$+"screen"+R$+R$+"1";:PRINT@
233,"green"+R$+"screen"+R$+R$+"2
";:PMODE3,1:PCLS
43 XI$=INKEY$:IFXI$="1"THEN44ELS
EIFXI$="2"THEN45ELSE43
44 R=5:SCREEN1,1:AC=0:GOTO46
45 R=1:SCREEN1,0:AC=1
46 LINE(23,27)-(49,43),PSET,B:FO
RI=50TO240STEP60:PC=PC+1:CIRCLE(
I,120),10,PC:PAINT(I,115),PC,PC:
CIRCLE(I,120),11,4:NEXT
47 FP=34:SP=36:C=2
48 PSET(FP,SP,C)
49 XI$=INKEY$:IFXI$="1"THEN51ELS
EIFXI$="2"THEN52ELSEIFXI$="3"THE
N53ELSEIFXI$="4"THEN54ELSEIFXI$=
"^"THEN55ELSEIFXI$=CHR$(10)THEN5
6ELSEIFXI$=CHR$(8)THEN57ELSEIFXI
$=CHR$(9)THEN58ELSEIFXI$="@"THEN
59
50 GOTO49
51 C=1:GOTO48
52 C=2:GOTO48
53 C=3:GOTO48
54 C=4:GOTO48
55 SP=SP-1:GOTO48
56 SP=SP+1:GOTO48
57 FP=FP-1:GOTO48
58 FP=FP+1:GOTO48
59 LINE(23,27)-(49,43),PRESET,B:
CLS0:SCREEN0,0:Z=30:GOTO65
60 GOTO60
61 IFAC=0THENSCREEN1,0ELSESCREEN
1,1
62 RETURN
63 IFAC=0THENSCREEN1,1ELSESCREEN
1,0
64 RETURN
65 DIMS(10)
66 GET(20,28)-(48,42),S,G
67 FORI=1TO90:PSET(RND(43),RND(1
9),RND(5)):NEXT
68 DIME(21):GET(0,0)-(43,19),E,G
69 GG$="BR2U2R2U2R2U2RD2R2D2R2D2
L9"
70 DRAW"S4BM14,192C3"+GG$
```

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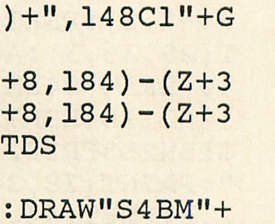
```
71 PAINT(19,190),3,3
72 DIMF(9):GET(0,185)-(41,192),F
,G:GOTO75
73 MS$=STR$(M1):MK=LEN(MS$)-1:MS
$=RIGHT$(MS$,MK):FORID=1TO MK:A(
ID)=VAL(MID$(MS$,ID,1)):NEXTID
74 DRAW"S8BM13,20"+Q$:FORSW=1TOI
D-1:DRAWN$(A(SW))+Q$:NEXTSW:RETU
RN
75 PCLS
76 CLS0:SCREEN0,0
77 GOSUB73
78 KL=4:K=0:GOSUB98
79 FORI=0TO176STEP48:FORY=28TO12
8STEP20:PUT(I,Y)-(I+28,Y+14),S,P
SET:NEXTY:NEXTI
80 FORI=4TO184STEP60:BI$=STR$(I+
20):DRAW"S8BM"+BI$+",165;C8U2E3R
6F3D2L4H2G2L4":PAINT(I+24,163),8
,8:NEXTI:GOSUB63
81 FORI=1TOSR:DRAW"S4BM"+STR$(12
6+(34*I))+",18;C3"+GG$:NEXTI
82 FORI=0TO80STEP3:PCOPY1TO3:PCO
PY2TO4:PMODE1,3:FORD=0TO144STEP4
8:IC=I+D
83 FORF=36TO136STEP20:IFPPOINT(1
0+IC,F)=R THEN84ELSEPUT(0+IC,F-8
)-(28+IC,F+6),S,PSET
84 NEXTF
85 NEXTD:PCOPY3TO1:PCOPY4TO2:PMO
DE1,1:GOSUB105:GOSUB87:NEXTI
86 GOTO75
87 IFPPOINT(Z+19,190)=R THEN111
88 XC=0:FORB=1TO26:IFC=1THENGOSU
B99
89 IFW=1THENGOSUB101
90 NEXTB:IFW=1THENRETURN
91 POKE339,255:W=JOYSTK(0):IFPEE
K(339)=254THEN101ELSEIFW<10THENG
OSUB94ELSEIFW>56THENGOSUB96
92 RETURN
93 PCLS:GOTO82
94 Z=Z-16:IFZ<=8THENZ=8
95 GOSUB98:RETURN
96 Z=Z+16:IFZ=>216THENZ=216
97 GOSUB98:RETURN
98 PUT(Z-2,185)-(39+Z,192),F,PSE
T:RETURN
99 FF=INT(K/20):KR=FF*20+4:PUT(Z
-4,186-KR)-(Z+39,170-KR),E,PSET:
LINE(Z-8,190-KR)-(Z+42,170-KR),P
RESET,BF:GOSUB61:PLAY"O5L255BO3C
":GOSUB63:W=0:C=0:PSET(Z+19,183-
K,R):K=26:KL=0:M1=M1+(5*FF)
100 GOSUB73:RETURN
101 W=1:PSET(Z+19,183-K,R):K=K+2
0:IFPPOINT(Z+19,183-K)=R THENC=0
:GOTO102:ELSE C=1
102 PSET(Z+19,183-K,3):IFK=>156T
HEN104
103 GOTO92
104 PSET(Z+19,183-K,R):W=0:K=26:
KR=0:GOTO92
105 GOSUB87:IFSB=1THEN108
106 XB=RND(4):IFXB=4THEN107ELSER
ETURN
107 SB=1:SC=RND(180)+35:RETURN
108 IFPPOINT(SC,160)=R THENBL=19
2ELSEBL=165
109 SB=0:DRAW"S4BM"+STR$(SC)+",1
48C2"+GB$:PLAYQQ$:LINE(SC,146)-(
SC,BL),PSET:PUT(SC-11,BL-18)-(SC
+11,BL),E,PSET:LINE(SC-11,BL-18)
-(SC+11,BL),PRESET,BF:GOSUB63:LI
NE(SC,146)-(SC,BL),PRESET
110 DRAW"BM"+STR$(SC)+",148C1"+G
B$:RETURN
111 FORDS=1TO4:PUT(Z+8,184)-(Z+3
0,192),E,PSET:LINE(Z+8,184)-(Z+3
0,192),PRESET,BF:NEXTDS
112 SR=SR-1
113 GOSUB61:COLOR3,1:DRAW"S4BM"+
STR$(126+(34*(1+SR)))+",18C1"+GG
$+"U2R13":SOUND1,4:GOSUB98:GOSUB
63:IFSR=0THEN114ELSE88
114 GOSUB63:FORI=200TO20STEP-20:
SOUNDI,1:NEXT
115 IFINKEY$<>CHR$(13)THEN115ELS
ERUN
116 SR=3:M1=0:Z=4:SR=3:GOTO75
```



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By Cray Augsburg
Rainbow's CoCo SIGop

Welcome to the Delphi Bureau. If you read this column last month, you know we covered some of the basic commands used in the Mail system on Delphi. This month we'll show you several commands that give total control of your Mail files.

Mail Commands

The following list describes several useful Mail commands.

`BACK` — This moves you back to the message prior to the one you have just read. If you just read message four, `BACK` allows you to read message three.

`COPY` — This command copies a message from one folder to another. Unlike the `FILE` command (discussed last month), it does not delete the message from the original folder. To use, just enter `COPY` *foldername*.

`EXTRACT` — puts the message in a file you choose in your Workspace, as opposed to adding it to a folder. This command is very handy for saving a copy of a message in Workspace if you want to download it later. The `EXTRACT` command has several options:

`Extract/Append` *filename* — adds the message to the end of an existing file in Workspace.

`Extract/Noheader` *filename* — saves the message, which can be an ASCII or binary program file, to the indicated filename in Workspace after deleting the Mail header from the file. If the file is a program, it may then be downloaded and immediately run.

`EXTRACT` can also be used in conjunction with other commands, such as `SELECT`, to work on all messages in a selected group. For this, you would use the `Extract/All` option.

`NEXT` — This command skips over the current message and starts sending the next message to your terminal. Just enter it at any "Press ENTER for more" prompt when reading a long message.

`SEARCH` — If you want to find a given string in your current folder of messages, use `SEARCH` *text string*. This will search every message in the folder for the occurrence of the named string. The string may appear in the "To:" and "Subject:" fields as well. When it encounters the string, the message will be displayed. To continue using the same string to find other occurrences, just enter the `SEARCH` command again without retyping the search string.

`SELECT` — This is one of the more powerful commands in Mail. It establishes a folder of messages that future commands can affect as a group. You can use the `COPY`, `SEARCH` and `EXTRACT` commands to manipulate these messages.

`SET` — Use this command to alter the characteristics of your Mail setup on Delphi. Following are commonly used command structures. For more commands and examples, type `HELP SET` at the MAIL> prompt.

`SET COPY_SELF` — This establishes the default for whether the `SEND` or `REPLY` commands return a copy of the message being sent to the user sending the message. Options with this command are Nosend and Noreply.

`SET FILE` — establishes or opens another file as your current mail file. The default file will be `MAIL.MAI`. If you use the `COPY`, `FILE` or `MOVE` commands to close other mail files, you can then use `SET FILE` to open those files.

`SET FOLDER` — This enables you to change folders within a given mail file. `SHOW FOLDER` can be used to display the currently set folder.

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`SET FORWARD` — establishes a "forwarding address" for your mail messages. The "address," or username, you specify will receive all messages addressed to you.

`SET PERSONAL_NAME` — allows you to add to the From: field of any mail messages you send. A good item to fill this with is your real name, so that users receiving your mail will know who you are.

As you can see, the `SET` command is very powerful and useful. Use the `HELP SET` command to find out more about `SET`.

Last month, we discussed the `READ` command. This month, I have a few more comments to make about `READ`.

Sometimes your message counter in Mail will indicate you have no more messages, but there really might be some new messages. This could occur if you are reading your mail while "gagged." You can check to find out by typing `READ/NEW`. If there are any new messages, you will then begin reading them.

`READ/BEFORE` and `READ/AFTER` are beautiful commands. They allow you to read messages before or after a specified date. As an example, to read all messages before September 24, 1986, enter `READ/BEFORE 24-SEP-1986`.

Distribution Lists

By using Mail commands and Workspace commands you can create what are known as distribution lists. A distribution list is a list of usernames to which you may choose to send a copy of a letter. It is useful if you commonly send mail to the same group of people. First, go into Workspace and create a file containing all the usernames to which you want to send mail. Each username must be on a separate line. Also, the filename must end with the extension `.DIS`. To send a message to a distribution list, just enter `@`*filename* at the "To:" prompt of the send command. For example, to send mail to the list `FRIENDS.DIS`, enter `@FRIENDS` without the extension at the "To:" prompt.

We thank Delphi for this information, which was derived from The Del-

DATABASE REPORT

Although the CoCo 3 has not yet become available to most CoCo owners, we already have files in our CoCo 3 News database with preliminary specifications on the GIME chip and a tutorial on the workings of the CoCo 3's memory manager, kindly uploaded by **Kevin Darling** (KDARLING). **Jerome Kalkhof** (GRUMCLUB) uploaded his own impressions of it (he seems to prefer Commodore machines). **Larry Wimble** (formerly THEASSEMBLER, and now LARRYWIMBLE) has already uploaded a responding essay to that one. I uploaded three files concerning the machine, including some critiques of aspects of it and some inside information on how to order from National Parts the needed PAL fix for the multipack and the 512K memory upgrade board. One of these files is an essay that compares the CoCo 3 to the Atari 520 ST.

Dale Lear (DALELEAR) has been busy organizing and enabling files in the OS-9 database. **Jonathan Guthrie** (SCIGUY) (one of our more vocal forum members) has sent us a *Sieve of Eratosthenes Benchmark* program in C, **Milt Webb** (MILTWEBB) has given us a *Sort* program in C, and Dale Lear has provided some patches and fixes for his OS-9 text editor programs *TSEDIT* and *TSWORD* (these are available at your local Radio Shack store). **Denny Skala** (DENNYSKALA) uploaded a powerful OS-9 based disassembler. **Don Hutchison** (DONHUTCHISON) has provided a text file to answer questions about how to download using OS-9. He also has provided some patches for *CCDISK* that allow customizing the step rate and motor on delay for much faster disk access. **Ronald Cole** (RONALDCOLE) has provided software and hardware instructions on how to use a remote terminal to talk to OS-9. **Rick Adams** (RICKADAMS) has provided source code for a utility to change the color of the cursor under OS-9 Version 2.0. **Dan Angelich** (BOWSIN) uploaded a valuable conversion program that converts files from Disk Extended BASIC to OS-9 format. He has also given us a story of his first experiences with the OS-9 operating system. Much of the material uploaded either includes or is in the form of source code in assembly or C, and can constitute a tutorial for folks wanting to learn programming under OS-9. Some of the material was commented for use as a tutorial.

In the Source Code for 6809 database Edward Coen (EDCOEN) has sent us source code for an elaborate CoCo Disk Extended BASIC disk editor program. In the Product Reviews database, I have posted a preliminary review of an outstanding new CoCo OS-9 product, *Robot Odyssey*.

Our Utilities database has seen over a dozen new files added this last month. **Stanley Townsend** (ST) has provided a program to strip the carriage returns from *Telewriter 64* files, for later transfer to *VIP Writer* and MS-DOS-based word processors. Jerome Kalkhof has given us a complementary utility that adds line feeds to CoCo files and prepares them for subsequent conversion to an MS-DOS-based system. **Dan Downard** (DANDOWNARD) of "Downloads" fame has provided yet another utility of this sort. Dan has also given us a tracer utility called *Newtrace*. **Jim Martin** (JIMM) has given us a math quiz, and Don Hutchison has sent us a handy amortization utility. **Tom Bedwell** (REBECCA) has given us an elaborate *Lotus 1-2-3*-like spreadsheet program. **Loren J. Howell** (XENOS) has uploaded a CGP-200 graphics dump program. Other programs have been contributed to the Utilities database by **Mark Camp** (MARKCAMP), **Rex Cowan** (DOC10), **Dave Macleod** (SCORPION2), **Steven Schnautz** (WOODSMITH), **Excer R. Zayas** (NYPHOTO) and Dale Lear.

In our Hardware Hacking database, Kevin Darling has posted an article about Color Computer hard drive systems. It tells what you need to know to make your own CoCo hard drive system, assuming you have general computer hardware experience. Both the Tandy and third-party hard drive hookups are discussed. I've posted a note about the current generation of one-megabit EPROMs, and **Paul Kenneth Ward** (PKW) has shared his experience in setting the speed on full-height MPI drives.

In the Graphics database **Ira Goldwyn** (IRAG), who recently became a published RAINBOW author, has again sent several dozen enhanced digitized images of popular TV actors and cartoon characters. I've posted the October "CoCo Gallery" in the Graphics database, and **Art Flexser** (ARTFLEXSER) has provided us with a revised version of the *MAXCMP* picture compressor, which now provides for color flip of the files it creates. **Marc Leavy** (MARCWA3AJR) has contributed a patch for **Erik Gavril-**

phi Handbook as well as from experience in Mail.

Taking the Lead

In early October, the CoCo SIG took the lead as far as Forum messages are concerned. The CoCo SIG has more Forum messages posted than any other SIG on Delphi. Thanks to CoCo SIG Manager **Jim Reed** (JIMREED) for this observation which coincides with the SIG's first birthday! The SIG began operation on Oct, 12, 1985. While this does not necessarily mean we are the most active SIG on Delphi, it would appear we are the most talkative.

Size of the Database

Marty Goodman (MARTYGOODMAN) has provided us with another tidbit of information regarding our SIG. After using a special command in the databases, Marty has announced that we have some 2,500 files in our database totaling more than 12 megabytes of disk space. Let's double this by taking advantage of the Free Upload Time Offer, which Jim has posted in the Questions & Feedback section.

Thanks to Forum "Helpers"

We extend a special thank you to all members of the SIG who seem more than willing to help out in answering Forum messages. While the names are too numerous to mention, those people know who they are. It is people like this who make the CoCo Community what it is. ☐

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uk's (ERIKGAV) *Macintosh Picture Converter* program. **Richard Trasborg** (TRAS) has sent us several images of lovely ladies. **Greg Geary** (GJG) has given us a DMP driver for *MACPIX*. Don Hutchison has provided more of his wry humor with his "Burger King" cartoon.

In the Music database we have some big news. **Stephen Scherock** (SFSCHEROCK) has uploaded a utility that allows one to play Orchestra-90 type music files on a CoCo that does not have an Orchestra-90 hardware card in the system. Although, of course, compromises are made in getting the CoCo's hardware to generate the music, this will allow CoCo music lovers with other music hardware to sample the music. Stephen has also uploaded some music files. **Ray Wright** (RAYWRI) has been busy sending us 10 new *Musica 2* compositions. Other material has been uploaded to the Music database by **George McCashin** (GMCC), **Mike Carey** (MIKECAREY), **Don Kline** (DON13), **Paul Seng** (PAULSENG), Tom Bedwell and **Tim Collier** (TIMEXTWIN).

In the Data Communications database we have just put a patch for *Mikeyterm* 3.0, written by Mike Ward, that allows it to run on the CoCo 3. The Delphi CoCo SIG and RAINBOW magazine managed to test Mike's code (Mike did not have a CoCo 3 at the time he wrote and sent us the patch), confirm it worked and get back to him all within 24 hours. **Cray Augsburg** (RAINBOWMAG) rushed to check that patch on RAINBOW's in-house CoCo 3. This patch will not allow operation in the CoCo 3 80-column mode. That may be available at a later date.

Two new utilities for *Mikeyterm* have been provided. Stephen Scherock has given us a revised version of *MTSTART*, allowing auto-dialing and setup configuration for several different communications situations. **Mark Gallagher** (GALLAGHER) has given us *MT*, a combination of *MTWPRS* and *MTHAYES* that at once patches, loads and starts *Mikeyterm* 3.0, and sets it up for use with both the Hayes Smartmodem command set and with the *WordPak RS*.

Art Flexser has uploaded some "bug fixes" for *Colorcom/E* Version 3.0 or 3.01.

Don Hutchison has been very active on our service, doing well over half of the work of enabling and fixing files in the database here. I want to thank him for his untiring efforts. If you submit a file, it is very likely it will be Don who examines it.

Over the next month I expect to upload back issues of the "CoCo Gallery" to the Graphics database. I also hope to upload graphics images of the original documentation for the *WEFAX* program published in the February 1985 issue of RAINBOW, along with a complete set of current versions of the *WEFAX* program, in variants for a number of printers and for a send/receive version. Now that the CoCo 3 is finally becoming available to the public, I expect our CoCo 3 News section to become more active. Expect to see the first public domain programs for it there, new technical information about it, and descriptions of any problems found in this brand new machine.

See you all on the Delphi RAINBOW CoCo SIG!

— Marty Goodman
(MARTYGOODMAN)
Delphi CoCo SIG Database Manager

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Computers and Our English Vocabulary

By Michael Plog, Ph.D.
Rainbow Contributing Editor

The English language is one of the most (possibly the single most) flexible languages in the world. English contains a great number of words with specific definitions. About 450,000 words are now in general use in English. A lot of our words are adapted from other languages, such as French (when William the Conqueror invaded England, he made French the language of the ruling class), Latin, German and old Celtic languages (through earlier invasions of England). It is my understanding that English vocabulary is twice the size of other, related languages, such as French, Italian, Spanish and German.

When we want to express ourselves, we have far greater opportunities than people speaking other languages. At the opposite end of the spectrum from English is Taki, a language spoken in parts of French Guinea that has only 340 words. Our large vocabulary allows us to convey our thoughts to others with a richness of meaning and a minimum of confusion.

Of the 450,000 words now in general use in English, Shakespeare would have understood only about 250,000. Of all those words added since Shakespeare's time, about half have come into use during the past 50 years. The language is growing even today.

The dictionary in our house has a few pages at the beginning entitled "New Words." These are words which are new to the English language ("ninja" and "kung fu" are examples); new uses of previously existing words ("jet lag"); or words once primarily used only by specialists but are now in general use ("clone"). It is fascinating to read some of these words, and to realize that NOW accounts at banks come from the term "Negotiable Order of Withdrawal."

As you might expect, many of these new words come from the computer and electronic fields. One example is the term "micro," which has always meant "very small" since ancient Greek times. Some of our new English words include microwave oven, microprobe, microdot, microfische microcircuit and microcomputer.

The new computer words in the English language come in different forms. Some new English words have a background in computer science, or have been made possible by computers, but still relate only to technical concepts. As an example, we have all heard of the the CAT scan in the field of medicine. The term comes from "Computerized Axial Tomography." The CAT scan equipment (and, thus, word) would be impossible without computers. This is not a computer term, but a medical term whose existence relies on computer technology.

Other new words apply only to areas of computer science, but are used and understood by the general population. If you talk about artificial language or artificial intelligence, almost everyone will know it has something to do with computers. Most people know the term "BASIC" as a computer language, even if they do not know how to program in BASIC, or even use computers. Also, most people, including those who never use computers, will have some idea of the use of terms like binary, chip, core, cursor, daisy wheel and floppy disk.

Because of the wide interest in computers in the United States today, the specialized vocabulary has been absorbed by our culture quickly. With the effect of computer education in schools, we can expect the next generation of Americans to have these terms as a natural part of their speech, and perhaps a better understanding of the definitions than many of us today have.

My favorite new English words derived from computer jargon, however, are those words that have adopted new meanings. These are words that began in the computer field, but have since taken on wider uses. Some words have been around for a long time, but have had meanings changed or expanded because of their use in the computer field.

Consider the old, faithful word "program." This word started as a noun

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outside the computer area. We used to speak of a program as a plan to be followed, or the total of the individual components of a plan. Then, the word entered the area of computers and became a set of instructions for the machine to follow. It was still a noun (we wrote the program), but soon took on verb meanings also (we programmed the machine). People who have never seen a computer, never even been inside a Radio Shack computer store, know the definition of the term and know that computers are programmed by humans.

But in the past few years, the word has adopted a wider meaning. We now speak of programming humans, with both a positive and negative aspect. We can be programmed to wear seat belts, control our anger, or any number of things we used to do differently. People who have undergone intense mental conditioning are now considered programmed. Specialists deprogram youngsters from religious cults and reprogram them to live in more conventional society. The term "deprogramming" is listed in the dictionary as the process of eliminating a set of thinking caused by intensive indoctrination. Now that is a great promotion for a word that started as "plan."

Other words from the field of computer science have been accepted into our language, then altered to assume a wider definition. The term "debug" came from computer science, referring to corrections in a computer program. (See this column in the October 1986 RAINBOW.) We now speak of debugging relationships with other people, or of working the bugs out of any new activity. "Feedback" is another example of an electronic term that has come to have broader meanings. Speakers get feedback from audiences; teachers get feedback from students. A "glitch" no longer just means a malfunction of a machine due to a surge of power, but now can refer to any problem from a relatively small source.

Have you ever heard an employer say he wanted someone "online" as quickly as possible, so the new person could "interface" with people necessary to complete the task before the whole "program" got "zapped?"

Some people believe that our language controls our thoughts. The way we think is determined by the vocabulary we have with which to express our thoughts. I do not know whether that is true or not. But, a large vocabulary allows us to express ourselves with greater precision and have greater control over how we share our thoughts with other people. In essence, communication is limited by vocabulary. We are fortunate that our language is less limiting than other languages — we can communicate our thoughts with fewer limitations. We should also recognize the debt we owe to the field of computer science for giving us a richer vocabulary for our communications.

Education is learning: knowing the thoughts of others and sharing our thoughts with other people. Before we can express a thought, or learn from the expressions of others, we need to have a language capable of accommodating that thought. Because our language is still growing, our thoughts can continue to grow. If we ever get caught in an "endless loop," our thoughts will stop growing, and education will stop.

If you want to share your thoughts, please write me at 829 Evergreen, Chatham, Illinois 62629. Until next time, happy words!

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Rimersburg, PA 16248
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Best Wishes for a Happy, Healthy Holiday Season from Sugar Software

We make all of our holiday greeting cards with

The CoCo Calligrapher

and so can you!

The CoCo Calligrapher works on these printers:

Epson: MX80, FX80, 100 (8 1/2 x 11 size only), and all models with graphtrax
Gemini: 10, 10X, 15, 15X (81/2 x 11 size only)
Radio Shack: LP7, LP8, DMP100, 110, 120, 200, 420, 510, 2100
Okidata: 92A - unless it is version 4. The ROM has a bug and the dealer should replace it for you.
Banana: Behaves like a Radio Shack
Prowriter: 8510

These type styles come on the CoCo Calligrapher program tape or disk:

Old English
Gay Nineties
Cartoon

Tape - $24.95
Disk - $29.95
Both require 32K ECB

These additional type styles are also available — **$19.95 each, or $49.95** for all on tape or disk.

Tape 1

Old English-reduced
Old English-reverse
Old English-reverse/reduced

Cartoon-reduced
Cartoon-reverse
Cartoon-reverse/reduced

Gay Nineties-reduced
Gay Nineties-reverse
Gay Nineties-reverse/reduced

Old English Cartoon Gay Nineties

Tape 2

Broadway
Broadway

Broadway
Broadway-reduced
Broadway-reverse
Broadway-reverse/reduced

Old Style
Old Style

Old Style
Old Style-reduced
Old Style-reverse
Old Style-reverse/reduced

Tape 3

Business
Business

Business
Business-reduced
Business-reverse
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Antique
Antique

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Antique-reduced
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Simplify all of your Holiday Mailing with TIMSMAIL

$19.95 - Tape
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Compatible

- User friendly
- Detailed tutorial & guide
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Spend some quality time with your family and play

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Tape -
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A very simple graphics adventure game for young children and their families.

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Continued from Page 10

Gold Star Performance

Editor:

I have received such outstanding service from one of your advertisers that I would like to call it to the attention of you and your readers.

I own a CoCo 2 and one disk drive. I decided to purchase a second drive from the Computer Center, Inc., in Memphis, Tenn. About six months after I purchased this drive, it developed a problem. I returned it to the Computer Center with a note. It was returned 10 days later with a note saying that the drive worked and the only charge was for shipping and handling. I thought that was fine, since the drive worked perfectly when I connected it.

About two weeks later, the drive developed the same problem. I sent it back to the Computer Center again. This time it was returned within eight days and it had been repaired free of charge, and they didn't even charge postage and handling. It is so hard to get prompt, courteous service these days. The drive has been working fine ever since.

Howard D. Clark
El Paso, TX

A Veteran Beginner

Editor:

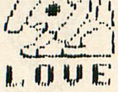
I'm writing to tell you about Paul Bangert of Bangert Software Systems. After ordering the *Super Programming Aid*, I had a question concerning it. In less than a week I had my answer from Mr. Bangert.

If anyone in CoColand needs a decent programming aid, the *Bangert Super Programming Aid* [reviewed in the July 1986 RAINBOW, Page 158] is the item to get.

I was really glad to read that you will always have things in RAINBOW for beginners. I've had my CoCo for a few years, but I'll never be a super programmer. I just make small, inefficient programs that keep me occupied.

Philip Beltz
Uhrichsville, OH

Label Legacy



Editor:

I have been lucky to have had my letter printed in your magazine and have gotten some very nice CoCo pen pals. I met one man who became very close to me and we wrote to each other every week for over a year. He was really great with the CoCo and had made an address label with a dog on it and the word 'love' under it for me because of a stamp I try to use all the time. Then he had a heart attack. His family wrote me about it. I am trying to find someone who could write a program to make this label for me. I will gladly pay for it. Can anyone help me? I have a 64K CoCo, tape and a DMP-105 printer. You have a great magazine and I wouldn't miss it for anything. Thanks for helping me meet some very nice people.

Sandra Steed
115 2nd Drive SE
New Philadelphia, OH 44663

KUDOS

Editor:

I just wanted to pay you a compliment on the wonderful opportunity you've given me, as well as many others, in providing us with such a treasure as RAINBOW. It is definitely a gift to all CoCo users!

I am a data processing major, with an associate's degree, working as a computer operator, on my way to becoming a programmer. I enjoy the programs RAINBOW provides, as well as all the ads for equipment and software to expand my system and help me program better and more efficiently. Thank you for that gift.

Bonnie Kitts
Williamsburg, VA

Please Don't Forget Us

Editor:

I ask you not to forget that it is the novice or beginner who makes your magazine grow, so consider the minimum equipment required to compute and address these people. I learned more from *Don't String Me Along* [October 1986, Page 100] than I have from any article in some time. Go get 'em Ellen and George Aftamonow!

I would like for someone to gather all errors ever gotten in BASIC and/or OS-9, with an explanation, reason, how to overcome, what caused the error and what they mean. Large order I know.

Harold E. Crunk
Maplewood, MO

My Favorite Record

Editor:

Why not have a Rainbow One- and Two-Liner book and tape to complement your Simulations and Adventure series? I'd buy one. Also, why not put the CoCo Gallery on tape? Even more than either of these, I'd like to see the Simulations, Adventures, One- and Two-Liners, and CoCo Gallery all on disk. This would be of great value to me.

Kerry B. Rogers, USN
FPO New York, NY

Doesn't Like OS-9

Editor:

Just when I had concluded that you and your magazine were hurting yourselves, patting yourselves on the back, you finally did something I consider worthwhile. *Writer-Zap* [September 1986, Page 116] is the program I have been looking for. I run my printer at 2400 baud and had to change that parameter manually each time. No more, thanks to you and special thanks to Ian Millard for making it available to the members of CoCo Community who use and like *VIP Writer*.

I have OS-9 Version 01:01:00 and I consider it to be a total waste of money. I have not been able to find anything useful to do with it, nor do I find I can learn what to do with it from Dale Puckett. I have the *Rainbow Guide to OS-9* but it assumes you know all about it and leaps in at full speed. I certainly am not going to spend $25 to upgrade to Version 2 of OS-9 until or unless I can find a use for it.

I am running a CoCo 2, a J&M controller and a double-sided, 40-track disk drive. I use a DMP-105. I would like to see some entry-level tutorials on OS-9 so I can figure out what to do with it and how to do it.

Keep Bill Barden going; he is the most lucid writer I have found on computers.

Sam P. Carroll
Olympia, WA

PMODE is Red, PMODE is Blue

I'm an honest person and I'd like to say,
I had the urge to get a computer one day,
Went to Radio Shack, walked in with ease,
The salesman said, "May I help you please?"

I said, "I'm looking for a computer,"
he asked, "What kind?"
I replied, "I'm not sure, let's see your line."
We looked at all the computers in the store,
My knowledge of computers, unknown, not anymore.

He asked, "See anything to suit you?"
I said, "I really like that Color Computer 2."
He picked up the computer and handed it to me,
He rang it up and the total came to $279.33.

I was so excited, I had a computer now,
But how to use it, I didn't know how.
I called Radio Shack that very day,
The salesman explained in full, right away.

After experimenting for about four weeks,
I had learned a lot about pokes and peeks,
I bought software that worked my way,
But I had one problem, only 16K.

I searched and found an upgrade for 69 bucks,
It was from Spectrum Projects, was I in luck.
My order was filled and filled very fast,
I had my upgrade I wanted, 64K at last.

The magazine I had was called RAINBOW,
Got it from a friend, where he got it I don't know.
RAINBOW was filled with articles to read,
My friend told me, "That RAINBOW is a need.

I've been reading RAINBOW ever since then,
Of all computer magazines, RAINBOW always wins.
With Lonnie Falk as its editor,
I don't think RAINBOW could be better.

I supported my CoCo 2 all the way,
Until I heard about the new CoCo 3 one day.
With its exciting new features, I was amazed,
Its brilliance and colors flared with a blaze.

I haven't had a chance to try one out,
From what I've read, it's the best without a doubt.
My local Radio Shack hasn't received them yet,
When they do, I'll get one, you can bet!

RAINBOW is, and will always be for me,
I know it'll get better, thanks to CoCo 3.
RAINBOW magazine will always be the best,
But I think it's time to put my pen to rest.

Andrew Urquhart
Metairie, LA

PEN PALS

- I'm looking for a CoCo pen pal. I'm 14 years old and have a 64K CoCo 2 BASIC Version 1.1 with disk and a cassette recorder.

Jon Larson
P.O. Box 237
Seligman, AZ 86337

- I read the letter in the July 1986 RAINBOW [Page 10] about all the different countries THE RAINBOW is sent to. I already have pen pals in Australia, Canada, Argentina and Brazil, but would like pen pals in other countries. I would also like to hear from anyone who is interested in war and weapons, law or politics.

Tim Vogel
2425 Greendale Road
Wilmington, DE 19810

- I have a 64K ECB system with a cassette recorder and am in search of a pen pal. I am 16 years old.

Brannon Baxley
P.O. Box 355
Live Oak, FL 32060

- Anyone who wants to be a pen pal and has a cassette player please write me. I will answer all letters. You can help me keep my expenses down by sending an SASE.

Dane Kramer
802 N. DeQuincy
Indianapolis, IN 46201

- I'm searching for pen pals who are interested in heavy metal, Adventure games and computer graphics. I have a 64K CoCo, disk drive, DMP-110 printer and the fantastic *CoCo Max*. All ages are welcome to write.

Erik Ames
406 East 12th Street
LaPorte, IN 46350

- I'm 15 years old and would like a pen pal. I have a 64K computer, double disk drive, cassette recorder, modem and a DMP-130 printer.

Yvonne Hinkle
RR 1, Box 358
Washington, IN 47501

- I'm 16 years old and have a 64K ECB CoCo 2, two double-sided disk drives, DMP-105 printer, 300/1200 Baud modem and would like to have some pen pals.

Michael Adams
31740 Courtney Cr.
Walker, LA 70785

- I would like to have a pen pal who owns a CoCo 1 or 2. I'm 16 years old and own a CoCo with dual-disk drive, cassette recorder and a Spirit-80 printer that thinks it is an Epson.

Kelly Stone
P.O. Box 225
Rose City, MI 48654

- I would like to hear from other CoCo owners who are involved in law enforcement, particularly those who have written job-related programs. Also, I would like to hear from law enforcement people from other countries.

J.E. Borger
Box 52
South Dennis, NJ 08245

- If you enjoy throwing out your 16K Color Computer, trashing your DMP-105 printer or putting an ax in your color TV — do not write to me. If you love your CoCo, please write to me.

Michael Albert
661 Neptune Boulevard
Long Beach, NY 11561

- I am 13 years old and want pen pals who are having trouble with programs, games or anything else. Must have a cassette recorder and disk drive.

Eurik Perez
358 Wadsworth Avenue
Apt. 43
New York, NY 10040

- I am looking for a pen pal who enjoys Adventures. I am 10 years old and have a TRS-80 Color Computer with disk drive, printer and modem.

Brad Bergstresser
26027 Redwood Drive
Olmsted Falls, OH 44138

- I would like to have pen pals who have a CoCo 2 with at least 32K. I have many tapes but I don't have a disk drive.

Joel High
2155 Jarvis Road
Lancaster, PA 17601

- Anyone who wants a pen pal in the USA please send an SASE or 25 cents. I will try to answer all letters. This offer stands for people in foreign countries also.

Blake Cadmus
1106 Whitfield Boulevard
Reading, PA 19609

- I am interested in getting a CoCo pen pal. I am 14 years old and have a 64K CoCo 2 and tapes.

Jason Maxwell
867 Rye Street
Manchester, TN 37355

- I am willing to correspond with CoCo users anywhere in the world who have a similar or compatible CoCo configuration to mine (tape, ECB, modem and printer). I hope to have a disk drive soon.

Bill Kroulek
13809 Lillard Road
Soddy, TN 37379

- If there are any CoCo users who want to write to me, I'd be very pleased. I am 14 years old and own a TRS-80 64K computer.

Ben Stimmel
P.O. Box 44
Burlington, TX 76519

- I'm looking for a girl pen pal. I have a 64K CoCo with printer and cassette.

Pierre-Etienne Michel
808 du Chateau
St-Hilaire, Quebec
Canada J3H 1N4

- I am looking for a pen pal. I have a 16K CoCo 1.

Steven Freriks
P.O. Box 116
Englefeld, Saskatchewan
Canada S0K 1N0

- I would like to have a pen pal. For more information write me.

Shane Pasiechnyk
Box 344
Marysville, British Columbia
Canada V0B 1Z0

- I want to correspond with CoCo users who have MIDI systems using Yamaha DX and RX synthesizers and any of the following: *Colorchestra*, *Syntrax* by Intercomp, *CoCo MIDI* by Speech Systems and *Musica MIDI* by Speech Systems.

Ross Whitney
201-21 Pioneer Drive
Kitchener, Ontario
Canada N2P 1H1

- I am in search of a CoCo pen pal living in Germany or the USSR. I am 12 years old and have a 64K CoCo 2 and cassette recorder.

Mathieu Chouinard
616 Rue Hudon C.P. 500
LaPocatiere, Quebec
Canada 60R 1Z0

- I would like to write to anyone sharing my interest in Adventures. So far I have either solved or helped in finding the solutions to most of the Mark Data programs and *Dallas Quest*. At the moment I am having some difficulty with *The Vortex Factor*, *Major Istar* and *To Preserve Quandic*. I am 10 years old.

Scott Chase
3 Thomas Street
Baxter, Victoria 3911
Australia

THE RAINBOW welcomes letters to the editors. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or space.

Letters to the editors may also be sent to us through the MAIL section of our Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type `SEND` and address to: `EDITORS`. Be sure to include your complete name and address.

DOWNLOADS

Now's the Time to Get Online

By Dan Downard
Rainbow Technical Editor

• *Having just purchased a Modem I, I dug through back issues only to find zilch. Can you explain how to use my modem?*

Mervyn Swaine
Hantsport, Nova Scotia

So you want to join the ranks of telecommuters, Mervyn. Really all you need is the modem, a cable to connect it to the computer, a cable to connect it to your telephone, some terminal software, and the telephone number of your local Uninet pad in order to get on Delphi. (See the ad in this issue for more details.)

A few terminal programs have appeared in the RAINBOW. If you have a CoCo 3, a terminal program appeared in last month's issue. All that the terminal, or communications, program does is allow you to send and receive data over the telephone lines. The more elaborate programs have buffers — methods of storing text received or to be sent. Also, they have different protocols for reliable transmission of data. I recommend *Mikeyterm*. It is available on Delphi for the cost of your connect time.

The cables you need can be found at your local Radio Shack store. Your Modem I just converts the data to tones for transmission purposes. More elaborate modems are also available. They automatically dial and answer your telephone, and are capable of faster baud rates than your Modem I.

When you finally get connected to Delphi, send a message to DANDOWNARD or RAINBOWMAG on the CoCo Forum. We are always glad to hear from you.

• *A strange thing happens when I type* EXEC *without a machine language program in memory. The drive starts running, looking for a file on the disk in Drive 0 (if one is in the drive).*

What is the file the drive is looking for? Is it looking for a machine language file, BASIC file, ASCII file or OS-9 file? Does it load and automatically execute the file?

Willie Wong
San Francisco, CA

Willie, you are doing something wrong. When the command EXEC is found in a program, the microprocessor program counter (the address counter) jumps to the address pointed to by $009D. If there is nothing stored at this address, you're in never-never land. The disk drive is not looking for a file, but just running without any purpose. This is dangerous from a software standpoint since you may jump to a place in Disk BASIC that may re-format a disk, etc. I suppose that is why we have write-protect tabs. At the same time it will do no physical damage to the computer, and pushing reset will re-initialize the system.

• *Do you have to get an RGB monitor to use the 80-character screen and the Hi-Res graphics, or can that be done on a normal TV? I was also wondering about the option for adding more memory. Does more memory mean more string space, and does it give more room before OM Errors?*

Could you recommend a good word processing and small-business accounting program for the CoCo 3? I do not have a CoCo 3 yet.

Do you recommend getting OS-9 Level II for the CoCo 3? I have never used the OS-9 system, and I do not know whether that would be a good investment for a 14-year-old, self-taught programmer on a limited budget.

David West
Leesburg, FL

I see you are looking forward to the CoCo 3 with the rest of us, David. I wouldn't recommend using a TV with the CoCo 3 for Hi-Res graphics. The RF circuits are no different than in the present CoCos. It is impossible to send the necessary video information over a standard RF carrier. At the same time, a monochrome monitor works fine for 80-column word processing. Graphics are better on an RGB monitor, but a color monitor will suffice.

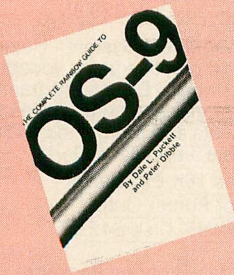
To take advantage of the added memory in the CoCo 3, at present you will have to use OS-9 Level II. There hasn't been time to develop software for RS-DOS, even though it's possible. You will still be able to write longer programs with the same amount of memory due to the fact that graphics screens are now stored in different memory banks, and do not interfere with program memory.

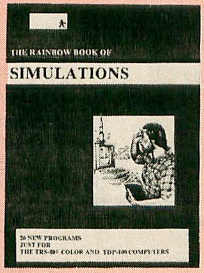
Because the CoCo 3 is so new we will have to see what kind of business software develops. Existing software will run, but most is formatted for a 32-column screen. It should not be too difficult to convert the screen formats. As far as OS-9 goes, there are several excellent word processors and accounting programs already available. Try contacting some of the established vendors such as Computerware and Frank Hogg Labs.

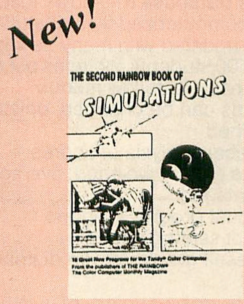
Dan Downard is an electrical engineer and has been involved in electronics for 27 years through Ham radio (K4KWT). His interest in computers began about eight years ago and he has built several 68XX systems.

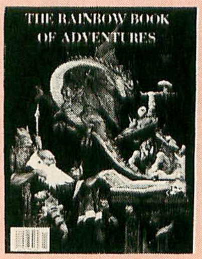
Recommended Reading for Your CoCo from . . .

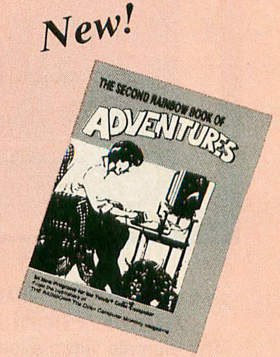
The Rainbow Bookshelf


THE COMPLETE RAINBOW GUIDE TO
OS-9
By Dale L. Puckett and Peter Dibble









The Complete Rainbow Guide to OS-9

The book that demystifies the state-of-the-art operating system for the Tandy Color Computer. Authors Dale L. Puckett and Peter Dibble show you how to take advantage of OS-9's multitasking and multi-user features, and the capability of redirecting input and output commands at will. An easy-to-read, step-by-step guide packed with hints and tips, tutorials and free software in the form of program listings.

Book $19.95
Disk Package $31 (2 disks, book not included)

The Second Rainbow Book of Adventures

This sequel features 24 of the most challenging Adventure games ever compiled. Meet the Beatles and battle the Blue Meanies, find a hidden fortune, or win the heart of a beautiful and mysterious princess. Experience the thrills and chills of the most rugged Adventurer without ever leaving your seat. *Ring Quest, Secret Agent Man, Dark Castle, Curse of Karos, Island* and more!

Book $13.95, Tape $13.95

First

The Rainbow Book of Adventures

A collector's item containing 14 winning programs from THE RAINBOW's very first Adventure contest. Includes such favorites as *Sir Randolf of the Moors, Search for the Ruby Chalice, Deed of the York, Horror House, One Room, The Door* and *Dr. Avaloe*. Plus, hints and tips on solving Adventures.

Book $7.95, Tape $7.95

The Rainbow Book of Simulations

Features 20 award-winning entries from THE RAINBOW's first Simulation programming competition. You are the Commander-in-Chief of the Confederate Army during the Civil War, an air traffic controller at one of the nation's busiest airports, the owner of your own software business, a civil defense coordinator in charge of saving Rainbow City from a raging flood, a scientist conducting experiments on Mars . . . Your wits are on the line.

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Coming Soon
The Rainbow Guide to Introductory Statistics

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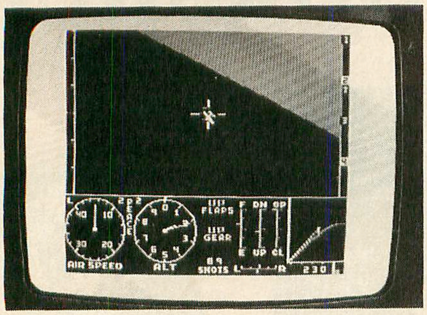
Mail to: Rainbow Bookshelf, The Falsoft Building, P.O. Box 385, Prospect, KY 40059.

Please note: The tapes and disks offered by The Rainbow Bookshelf are not stand-alone products. That is, they are intended to be an adjunct and complement to the books. Even if you buy the tape or disk, you will still need the appropriate book. OS-9® is a registered trademark of the Microware Systems Corporation.

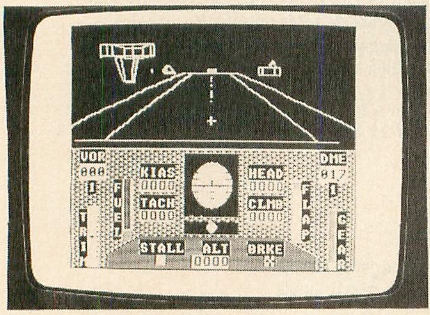
TOM MIX'S MINI-CATALOG



P-51 Mustang Attack/Flight Simulation

The ultimate video experience! Link two CoCo's together by cable or modem, and compete against your opponent across the table OR across the country! (Both computers require a copy of this program). The P-51 flight simulator lets you fly this WWII attack fighter in actual combat situations—against another player OR against the computer.

32K Machine Language
Flight Manual Included
Tape $29.95 Disk $34.95



Worlds of Flight Small Plane Simulation

Real-time simulation generates panoramic 3-D views of ground features as you fly your sophisticated plane in any of nine different "worlds." Program models over 35 different aircraft/flight parameters. Realistic sound effects too! Manual included helps you through a typical short flight.

32K Machine Language
Flight Manual Included
Joysticks Required
Tape $29.95 Disk $34.95

Educational Best-Sellers!

Teachers Database II—Allows teachers to keep computerized files of students. Recently updated with many new features!

- Up to 100 students, 24 items per student
- Many easy-to-follow menus
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- Individual progress reports
- Student seating charts
- Test result graphs/grade distribution charts

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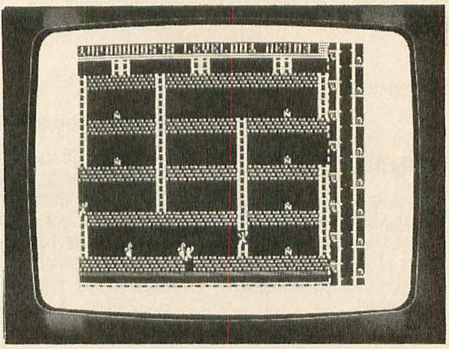

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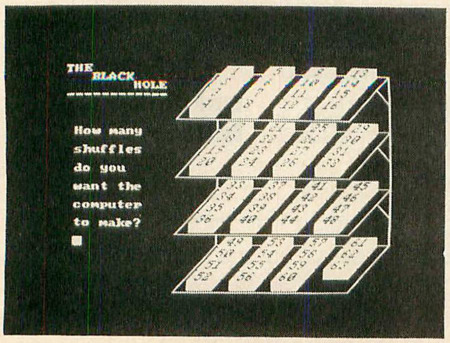

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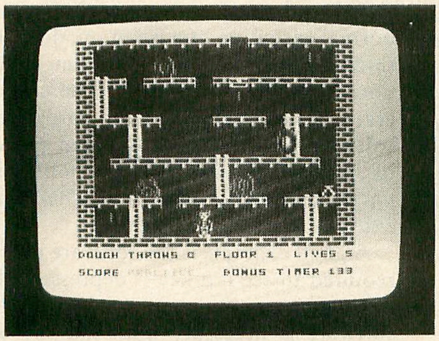

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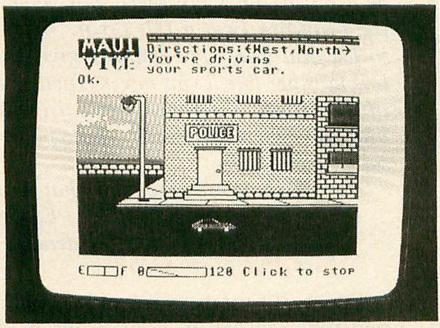

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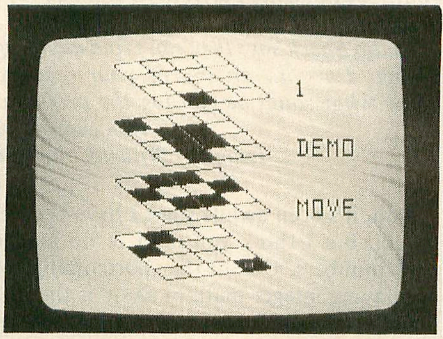

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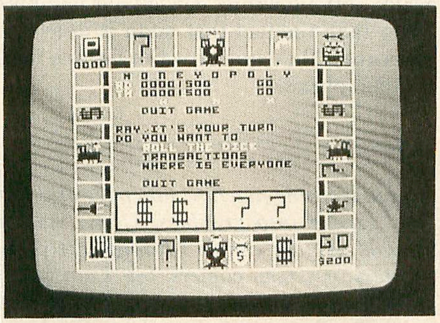

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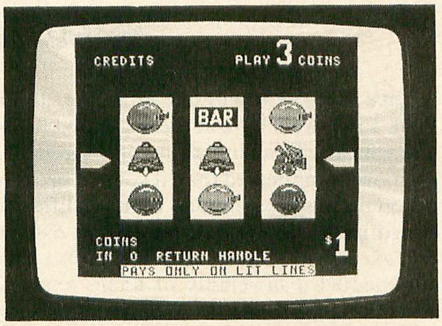

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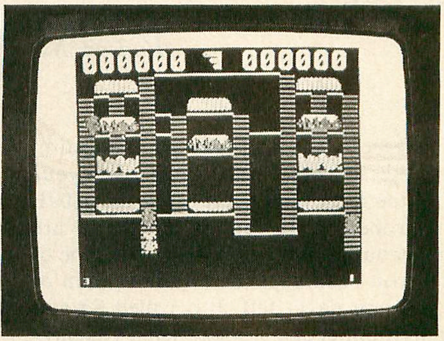

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• *Whenever I press the reset button on my CoCo 2, garbage appears on the screen and the computer crashes. Also, the click normally heard when reset is pressed is absent. What's wrong?*

Jeff Walker
Hudson, NC

The reset button is a hardware connection to the reset line of several devices inside your CoCo, the most important being the 6809E microprocessor. It sounds as if you are having trouble with this circuit. The type of switch you need depends on the version of CoCo 2 you have, Jeff. It is called S2 and the part number can be identified if you have a service manual for the version in question. There were several versions of the CoCo 2 produced.

You should hear two simultaneous clicks when the reset button is pressed. One is the switch and the other is the cassette relay. This is due to the fact that you are actually re-initializing the system.

• *About Melvin Halpern's letter concerning his Gemini 10 buffer [October 1986, Page 195], I experienced the same problem with my Gemini 10. I tried three commercial interfaces, all with the same results. I'm not sure what causes the problem. The computer updates the printer very slowly. It appears to be a problem in handshaking, or something in that area.*

However, the solution to the problem is on Page 202 of the November 1983 issue of RAINBOW. *After building this interface, my Gemini 10 prints a file almost four times as fast as it did when using the commercial interfaces.*

Jim Fodor
Warner Robins, GA

Thanks for the info, Jim. As the Gemini 10 is a very popular printer, I think several readers will benefit from your advice.

• *I'm having an unusual problem with my 'D' revision 64K Extended CoCo 2. It's lying to me! Somehow it has developed its own unique set of rules for mathematics. Within these rules it's very consistent in its answers to mathematical questions, except that these answers are as apt to be wrong as they are to be right. It makes no difference whether the calculation is in a program or entered directly, or if accessories are attached. Here is a simple example:* `PRINT 22.95-22.00` *and the answer it gives is* `.950003`.

The problem becomes serious when a relational test between two variables is made, and then the program branches, based on whether A<>. Example, the trial balance within a bookkeeping program. The books may balance perfectly, but CoCo says they don't!

Radio Shack says they can't find anything wrong. Do you, or any of your readers, know what could be causing the problem?

Ron Stanwood
Langley, British Columbia

Ron, it's been awhile since I have been in school, but I think you need to normalize your numbers. One of the shortcomings of not having integer math in BASIC is the fact that all numbers have to be normalized. By the way, my CoCo gives the same answer. One plus one is no longer two in the computer world.

It's not a problem, though. Try the following:

```
10 A=22.95-22.00
20 B=(INT(A*100+.5))/100
30 PRINT B
```

Line 20 is called normalizing and is required in all programs using integer math. There is really nothing wrong inside your computer other than the fact that math is done with algorithms that are correct to only so many decimal places.

• *I am learning machine language and I am now getting into graphics. I have had no trouble making simple routines like point-plotters or screen copiers, but I am having trouble with routines requiring complicated math like line and circle makers. Could you please tell me where the Extended Color* BASIC *line routine is, or at least how it is done? I really need help.*

I would also like to know if it is possible to switch only certain parts of ROM to RAM in a 64K machine. I can go to the all-RAM mode, but then I am unable to use the hardware addresses in $FF00 to $FFFF. How does one perform an interrupt request?

John-Paul Williams
Montclair, CA

Let's take the topics one at a time, John-Paul. First, we'll look at the Extended BASIC line routine. Drawing a line or a circle is a lot more complicated than it sounds because different graphics modes require different coordinates. I suggest *Extended BASIC Unraveled* by Spectral Associates. This commented disassembly of BASIC explains all of the steps necessary to make ROM calls for machine language programs. If you want to disassemble BASIC yourself, the line routine is at $93BB. Keep in mind that it first checks to see if it's a `LINE INPUT` command.

You can still use the hardware addresses from $FF00 to $FFFF in the 64K mode. This will also be the case for the CoCo 3, even though you will be able to switch in banks of memory in 8K increments. Keep in mind that this bank switching is only implemented using OS-9 Level II, or for graphics screens.

Interrupts will be a hot topic with the advent of the CoCo 3, and will be used extensively. An interrupt is an external signal to the microprocessor that stops the normal execution of a program, does something else for awhile, and then resumes normal program execution. There are several types of interrupts, both hardware and software, and they tend to speed execution of software because software polling is no longer necessary to find out what kind of external events are happening.

A good example is the software overhead required to see if a key is depressed. If this is set up as an interrupt type of event, no software is necessary until the key is depressed, generating a hardware signal to the microprocessor. Earlier CoCos did not have the hardware necessary to implement all types of interrupts. The GIME chip inside the CoCo 3 uses interrupts extensively. We'll keep you up to date as more information develops.

• *I have a 64K CoCo 2 and I seem to have a problem when I type in a program of some length. When I list the program it will list as if all the lines are there, but when I run the program I get a UL Error. When I try to list that line, the computer gives just the line number like it was never typed. The rest of the program is gone when I list it line by line, but when listing the whole program it seems to be there.*

Can you help me or tell me what is wrong?

Edgar Barr
Goldendale, WA

Edgar, it sounds as if you have an incorrect function call in your program that is overwriting some of your memory. Check all of the functions such as `POKE`, `EXEC`, etc., to see if the proper arguments are included, and whether they are correct.

Your technical questions are welcomed. Please address them to: Downloads, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We reserve the right to publish only questions of general interest and to edit for space and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Your technical questions may also be sent to us through the MAIL section of our new Delphi CoCo SIG. From the CoCo SIG> prompt, pick DELPHI MAIL, then type `SEND` and address TO: DANDOWNARD. Be sure to include your complete name and address.

PRINTER UTILITY

OS-9 Spooler: Print a File as a Background Task

By Stephen B. Goldberg

One of the first things I tried when I fired up OS-9 on my CoCo was printing a file as a background task (`list file >/p &`). What a disappointment that was! Each time a line was read from the disk and every time data was sent to the printer through the standard CoCo serial port, the computer hung up.

However, there is a printer utility, similar to one I saw described in a UNIX text, that permits background printing with just a bit of slowing of any other work. The program *lpr*, is not for use with a hardware serial port such as Tandy's or PBJ's but for the "plain vanilla" Color Computer RS-232.

The program consists of a buffer to hold text (cutting down on disk accesses) and its own routine to send characters directly to the printer, one at a time, without using the OS-9 printer device driver which hogs computer time.

The baud rate is automatically set by reading it from the device descriptor, `p`. The constants in the listing work for my computer and printer, and I imagine that they should be OK for you, also. If your printer produces nonsense, juggle the values a bit. The slower baud rates are fairly tolerant, but at higher speeds, a change of one or two can make a big difference.

Don't be disturbed by the warnings you receive when you assemble *lpr*. The program directly addresses RAM locations, which OS-9 doesn't like. The program is not reentrant for the same reason (even thought it says it is).

To use this program, type `lpr` followed by the name(s) or pathlist(s) of the files(s) you want printed, followed by an ampersand (&), which makes *lpr* run as a background task and returns the use of the computer to you while your file(s) print. For example:

```
lpr fileone filetwo & ENTER.
```

The default buffer size is about 4K. To reduce disk access to a minimum, make the text buffer as large as possible by using the # command line modifier. If you can, make it large enough to hold the entire file. Be sure to leave enough memory free to run whatever other program you want to use while your file(s) are being printed. For example:

```
lpr bigfile #20K & ENTER.
```

If you don't enter a filename after *lpr* on the command line, the input is via the standard input path and data can be accepted from another program through a pipeline. For example, you can print the output of a text formatter:

```
form <texfile ! lpr & ENTER.
```

If you forget to use the ampersand, your computer will proceed with printing your file(s) but you will not be able to use it for any other programs. In this case, press CLEAR-C and the printing process will move to the background and control of the machine will be returned to you.

The only way you can terminate a background process is with the `kill` command. When you execute *lpr* using the ampersand on the command line, you will see the process ID number displayed on the screen after pressing ENTER. If you want to stop the program before it has finished printing, enter `kill` followed by the process ID number. If you have forgotten the process ID number, you can always find it by using the `procs` command.

That's about it. It makes life with CoCo OS-9 a bit more pleasant.

(You may direct questions about this program to Mr. Goldberg at 695 Plainview Road, Bethpage, NY 11714, 516-681-7209. Please enclose an SASE when writing.) ☐

Steve Goldberg is a dentist and lives in Bethpage, N.Y. He was taught programming by his son Joe, a high school senior.

The listing: `spooler`

```
**************************************************
*
* LPR  -  COPYRIGHT (c) 1985 by S. B. GOLDBERG
*
* PRINT SPOOLER FOR STANDARD COCO SERIAL PORT
*
* Use: lpr [filename] [...] &
*
*     <program> ! lpr &
*
*     lpr <filename &
*
* Use '#' modifier to enlarge buffer.
*
         ifpl
         use   /d0/defs/os9defs
         endc
*
         mod   len,name,prgrm+objct,reent+1,entry,dsiz
*
path     rmb   1   file path number
startbuf rmb   2   starting address of buffer
endbuf   rmb   2   end address of text
bufsiz   rmb   2   size of buffer
pointer  rmb   2   filename pointer
count    rmb   2   delay constant
buffer   rmb   4000   buffer
         rmb   200  stack
         rmb   200  parameters
dsiz     equ   .
*
*
name     fcs   /lpr/
         fcc   /(c) 1985 S.B.GOLDBERG/
descript fcc   /p /
******************************
*
* BAUD RATE DELAY CONSTANTS
*
table    fdb   $0168   300 baud
         fdb   $00af   600 baud
         fdb   $0056   1200 baud
         fdb   $0029   2400 baud
         fdb   $0012   4800 baud
         fdb   $0007   9600 baud
******************************
*
* DATA INITIALIZATION AND
* BUFFER SIZE CALCULATION
*
entry    clr   path   set to standard input path
         leay  buffer,u   starting address of buffer
         sty   startbuf  save it
         tfr   x,d   data area top
         subd  startbuf   subtract start of buffer
         subd  #200   subtract stack bytes
         std   bufsiz   save size of buffer
```

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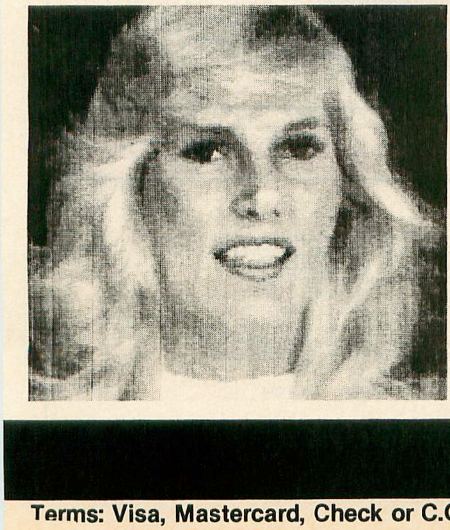
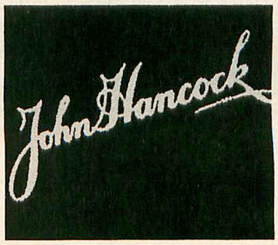

Printout

Screen



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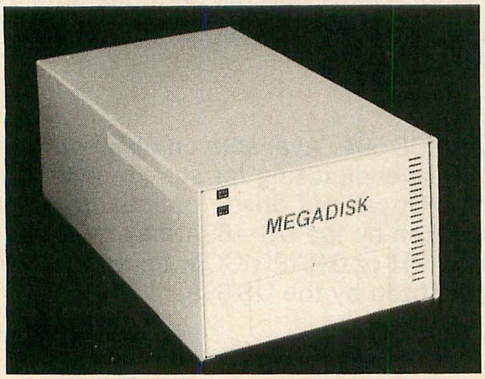

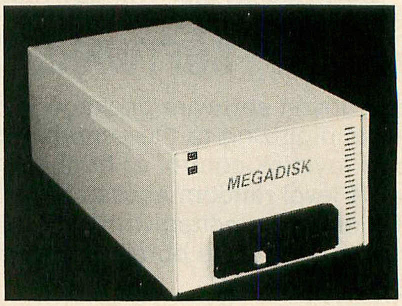

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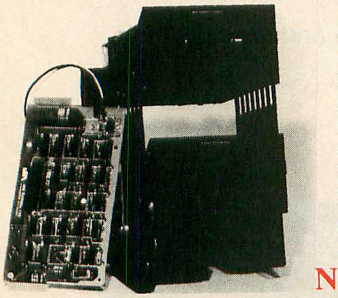

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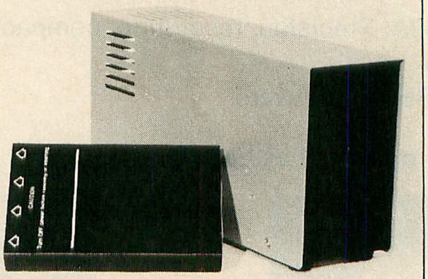

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```
********************************
*
* FIND BAUD RATE AND SET DELAY
*
         pshs  x   save parameter pointer
         leax  descript,pcr   device decsriptor name
         clra   any type or language
         os9   f$link   link to descriptor
         bcs   out   exit with error
         ldb   39,u   get baud rate
         decb   adjust value
         aslb   for table offset
         leax  table,pcr   constant table address
         ldd   b,x   get delay constant
         std   count   save it
         puls  x   retrieve parameter pointer
********************************
*
* CHECK FOR PARAMETER
*
         lda   ,x   parameter character
         cmpa  #$0d   parameter present?
         beq   read   no, read from standard input path
********************************
*
* OPEN FILE FOR PRINTING
*
open     lda   #read.   read mode
         os9   i$open   open file
         bcs   out   exit with error
         sta   path   save file path number
         stx   pointer   save pointer to next filename
********************************
*
* READ FILE INTO BUFFER
*
read     ldy   bufsiz   size of buffer
         lda   path   input path number
         ldx   startbuf   start address of buffer
         os9   i$read   read block into buffer
         bcs   error   branch on error
         tfr   y,d   length of block in buffer
         addd  startbuf   add starting address
         std   endbuf   save end address
         tfr   x,y   start of buffer to 'Y' register
********************************
*
* OUTPUT CHARACTERS TO PRINTER
*
write    lda   $ff22   get printer status
         asra   printer busy?
         bcs   write   yes, check again
         pshs  cc   no, save condition codes
         orcc  #%01010000   mask interrupts
         clr   $ff20   start bit to printer
         bsr   wait   delay
         ldb   #8   bit counter
```

```
outchar  lsr   ,y   get data bit
         rola   put in correct
         rola   position for output
         sta   $ff20   send out bit
         bsr   wait   delay
         decb   last bit?
         bne   outchar   no, send next one
         lda   #2   stop bit
         sta   $ff20   out to printer
         bsr   wait   delay for two
         bsr   wait   stop bits
         puls  cc   retrieve condition codes
         leay  1,y   address of next character
         cmpy  endbuf   last character?
         beq   read   yes, get next block
         bra   write   no, send next character to printer
*******************************
*
* ERROR CHECK
*
error    cmpb  #e$eof   end of file?
         bne   out   no, exit with error
         tst   path   standard input path?
         beq   noerr   yes, exit program
         lda   path   no, get input path number
         os9   i$close   close input file
         ldx   pointer   get parameter pointer
         lda   ,x   get next parameter character
         cmpa  #$0d   another parameter present?
         bne   open   yes, open next file
noerr    clrb   no, clear error flag
out      os9   f$exit   quit LPR
*******************************
*
* BAUD RATE TIMING LOOP
*
wait     ldx   count   delay count
waitl    leax  -1,x   done?
         bne   waitl   no, count some more
         rts   yes, go back
         emod
len      equ   *
         end
```

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BARDEN'S BUFFER

The BASIC PSET and Graphics Display Speeds

By William Barden, Jr.
Rainbow Contributing Editor

At one of the computer shows I attended recently, I saw a graphics display by Evans and Sutherland. It showed, in real time, a Harrier Jump Jet landing on a battle zone highway, taking off, and then overflying the area. The image was terrific — almost the same resolution you'd get from extended play low resolution mode on a VCR. Scenery, buildings and other features were continually updated and displayed on the screen, creating a scenario that made Sublogic's *Flight Simulator* look very crude. Let me hasten to add that I'm a big fan of *Flight Simulator* — I've flown between the World Trade Centers many times and put a number of dents in the Sears Tower with the Cessna 182. But the two displays are worlds apart. What's the answer? Why can't we get graphics like the Evans and Sutherland display on systems such as the CoCo?

There are several reasons. Although the CoCo 3 is a fast system, its graphics will not be fast enough. What is fast enough? As you might guess, there is no upper limit to the rate at which we'd like to update the screen. In this column we'll take a look at how fast graphics are, why they aren't faster, and what we can do about speeding them up. We'll provide a little assembly language subroutine that's 2½ times as fast as the one in BASIC, which might help you plot as well as the Borgias. We'll also show you how we developed the subroutine. Unfortunately, we'll also tell you what went wrong with the design so that the program is not a good one to call from BASIC.

Bill Barden has written 27 books and over 100 magazine articles on various computer topics. His 20 years experience in the industry covers a wide background: programming, systems analyzing and managing projects ranging from mainframes to microcomputers.

An Inefficient Screen

It's unfair to compare an Evans and Sutherland graphics system to a small computer's graphics capability. Evans and Sutherland builds its system around dedicated hardware — graphics functions such as drawing lines and figures are done with the help of high-speed electronics at nanosecond (billionths of seconds) rather than microsecond (millionths of seconds) response times.

The CoCo and other systems, the IBM PC, the Tandy MS-DOS machines, and other small computers, use "raster-scanned" graphics. The video display is updated like a television set's display by sweeping the light beam across the face to draw 525 horizontal lines. There are other types of displays that draw "vectors" on the screen as required — an oscilloscope is a simple form of this type of screen display. However, we're stuck with the raster scan display — actually an excellent choice, as the costs of the system can be kept low with this type of screen display.

The raster can update the screen with a complete frame 30 times a second. This is enough of a continuous update to provide a flicker-free picture. Ideally, then, we're shooting for updating graphics on the screen 30 times a second. However, even lower update rates, a few times per second as in the *Flight Simulator*, can provide a good simulation of movement.

The raster scan is updated from a graphics memory buffer, called graphics or text "pages." The current graphics or text page is an area of memory set aside that the graphics electronics in the computer continually read to update the display. Depending upon the graphics/text mode, several different types of mapping are used. In CoCo graphics displays, the two most common types of maps are one-bit and two-bit mapping, shown in Figure 1.

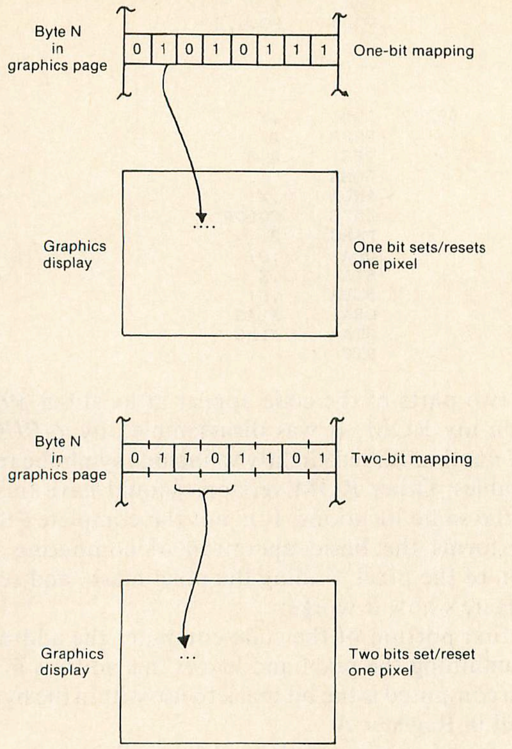

Figure 1: Graphics Display Mapping

In one-bit mapping, each bit in the graphics memory corresponds to one pixel, or picture element, on the screen. If `PMODE 4` is being used, the resolution of the picture on the screen is 256 horizontal elements by 192 vertical elements, each element having a corresponding bit in memory. Now 256 by 192 is 49,152 pixels or 49,152 bits. Since there are eight bits per byte, a 256-by-192, single-color mode takes 49,152/8 bytes, or 6,144 bytes in the graphics memory area. Each bit is either a 0 or 1, standing for one of two colors.

In two-bit mapping, every two bits represent one pixel on the screen. The possible permutations of two bits are 00, 01, 10 and 11. These four codes represent four different colors. Although the CoCo 2 *could* have a four-color, 256-by-192 mode, it does not. The maximum resolution four-color mode is `PMODE 3`, 128 by 192 pixels. Since 128 by 192 is 24,576 pixels, and because each pixel takes up two bits in memory, the number of bits is again 49,152 and the number of graphics memory bytes is 6,144.

The CoCo 3, of course, has a much greater resolution — 640 by 192 in four colors — requiring 640 * 192 * 2 = 245,760 bits or 30,720 bytes! More on the CoCo 3 when they become commonplace.

Bit Tweaking

All graphics display speeds boil down to one thing: how fast bits can be set and reset in the video memory (graphics page). As you know, 6809 instructions are oriented towards bytes and doublebytes (words). Data can be moved around from 6809 registers to memory and back again in chunks of one or two bytes (memory transfers are one byte at a time, but may occur twice for 16-bit operands). However, it's not as easy to manipulate bits. There is one "bit" instruction, appropriately called BIT, but all it does is test whether a bit in a memory byte is a 0 or 1. It would be nice to be able to set or reset a bit in a memory byte with one instruction. This is not to be, at least with the current version of the 6809. About the best we can do is:

```
LDA    VIDMEM    5
ORA    #80       2
STA    VIDMEM    5
```

These three instructions load Register A with a byte from video memory, set one bit (the most significant bit), and store the changed byte back again. In two-color, 256-by-192 mode, this would set one pixel on the screen.

How long do these instructions take? To find out, look in Appendix II of *TRS-80 Color Computer Assembly Language Programming*. The execution speeds of each instruction are given in cycle times. A cycle time is just a fixed clock pulse width (in the CoCo 2 it's 1.12 microseconds). The total cycles required in the three instructions are 12 cycles, or 13.4 microseconds. Of course, the previous code is not the whole story. We need more generic instructions to allow any byte in video memory to be accessed, and any bit within the byte to be set. Here's a more realistic code segment:

```
PSET    LDX    BYTE    6
        LDA    ,X      4
        ORA    MASK    5
        STA    ,X      4
        RTS            5
BYTE    RMB    2
MASK    RMB    1
```

This code makes up a complete subroutine. To set a pixel on the screen (in 256-by-192 mode), locations BYTE and BYTE+1 are loaded with the address of the screen byte to be accessed and Location MASK is loaded with the "mask" of the bit to be set — $80, $40, $20, $10, $08, $04, $02 or

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$01. There are 24 cycles here (26.9 microseconds). With this code it's possible to update an entire 256-by-192, two-color screen in 49,152 * 26.9 microseconds, or about 1.3 seconds.

Of course, there are some variables. If we want to clear a horizontal line, we can just store a $00 or a $FF in a single byte to handle eight pixels at one time, thereby increasing the speed by a factor of eight. Also, we may not want to update all of the pixels on the screen — perhaps only one quarter of the screen is being changed between frames — this increases the screen update rate by a factor of four. In general, though, setting any point will probably take no less than 26.9 microseconds. This means that we're stuck with an update rate of about .76 full screens, 1.5 half-filled screens, or three quarter-filled screens per second in real time, nothing approaching the Evans and Sutherland graphics.

About the only way to speed up the graphics is to sequentially display previously generated graphics data. You could, for example, load in 6,144-byte images from disk at a rate of 5 per second (the data transfer rate from disk is about 31,000 bytes per second and the screen can be updated at this rate with block moves). However, this would not be real time and you couldn't easily make the program interactive. (You could have sets of images on a hard disk, I suppose, but even a 10-megabyte hard disk could only hold 1,627 frames worth of 6,144-byte data — about seven minutes at 4 frames per second.)

How Microsoft Does It

With these discouraging limitations behind us, let's see how fast the BASIC `PSET` is. Here's some BASIC code to measure it:

```
100 SCREEN 1,0
110 PMODE 4,1
120 PCLS
130 TIME1 = TIMER
140 FOR X=0 to 255
150 FOR Y=0 TO 191
160 PSET (X,Y)
170 NEXT Y
180 NEXT X
190 TIME1 = TIMER - TIME1
200 IF TIME1 < 0 THEN TIME1 = 65536 + TIME1
210 PRINT "TIME="; TIME1/60
```

The time required to clear the screen by vertical columns is 248 seconds. Obviously, though, some of this time is spent in the "overhead" of the BASIC loop. How much? Substituting this statement deletes the call to `PSET` with an approximately equivalent statement:

```
160 X=X
```

The time now required is 150 seconds. Subtracting the two results gives about 98 seconds for the time of the `PSET` action itself, for 49,152 points, or about 2,000 microseconds (2 milliseconds = 2/1000th second) per point! Other tests bear this figure out.

The question now must be: Why does the BASIC `PSET` take 2,000 microseconds per point when the assembly language example we gave takes only 26.9 microseconds per point?

The answer lies in the Microsoft code for `PSET`:

```
$92A6  PSHS    U,B
       LDB     BYTESR
       LDA     YCOOR
       MUL
       ADDD    PAGEST
       TFR     D,X
       LDB     XCOOR
       LSRB
       LSRB
       LSRB
       ABX
       LDA     XCOOR
       ANDA    #7
       LDU     #MSKTAB
       LDA     A,U
       PULS    PC,U,B
       .
       .
       .
$9377  LDB     ,X
       PSHS    B
       TFR     A,B
       COMA
       ANDA    ,X
       ANDB    COLOR
       PSHS    B
       ORA     ,S+
       STA     ,X
       SUBA    ,S+
       ORA     FLAG
       STA     FLAG
       RTS
```

The two parts of the code appear at locations $92A6 and $9377 in my ROM. It was disassembled by *Z-BUG* in *ED TASM+* and modified slightly to include symbolic references to variables. Other ROM versions should have this code at about the same locations. It is not the complete `PSET` code, but performs the basic operation of computing the byte location of the pixel, finding the pixel mask, and setting the pixel. Here's how it works:

The first portion of the code computes the address of the byte containing the pixel and leaves this address in Register X. Also computed is the bit mask to use within the byte, which is stored in Register A.

The second portion of the code actually accesses the byte and uses the bit mask to set or reset the proper bit.

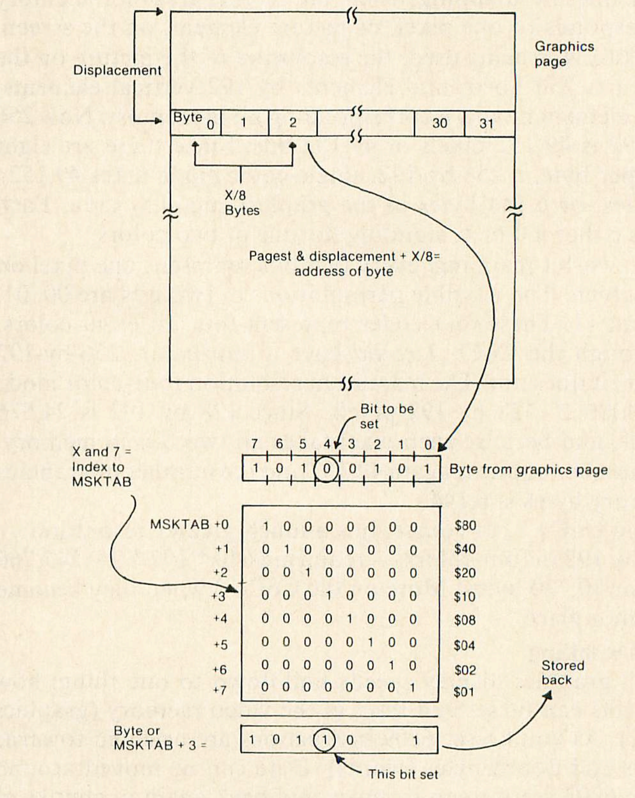

Figure 2: BASIC PSET Operation

In the first portion, the U and B registers are first saved in the S Stack. This is standard for any registers that will be used in a subroutine. The registers are restored at the end of the subroutine.

Register B is then loaded with `BYTESR`, a variable representing the number of bytes per screen row. This varies with the PMODE. For the 256-by-192 case it's 32 bytes — eight bits per byte for 32 bytes gives a complete row of 256 bits.

The Y coordinate YCOOR is now loaded into Register A and the number of bytes per row is multiplied by the value of the Y coordinate. The result is the displacement of the row in bytes from the start of the graphics page, as shown in Figure 2. Adding the beginning address of the current graphics page (PAGEST) now points to the 32-byte row containing the pixel, as shown in the figure. This address is transferred to Register X.

The X coordinate XCOOR is now loaded into Register B. Three LSRBs divide this value by eight to find the byte displacement from the start of the row 0 - 31. This value is added to X by an ABX. X now points to the byte containing the pixel as shown in Figure 2. The X coordinate is now loaded into A and ANDed with 7. The result is 0 to 7, and defines the bit in the byte that is to be set or reset. The bit mask value is loaded from the mask table (MSKTAB) by using the contents of A as an index value (LDA A,U). The bit mask table has entries of \$80, \$40, \$20, \$10, \$08, \$04, \$02 and \$01, reflecting the proper bit to be set or reset within the byte. A PULS PC,U,B now restores the U and B registers and returns from the subroutine.

The second part of the code uses the address in X and the bit mask in A to obtain the byte, AND out the proper bit(s), OR in the new color for a set or reset, and set a change flag if the graphic byte is unchanged. The crux of the operation is the OR, overly complicated here because more than one PMODE is handled by the routine.

There's no question that this code is neat, good code. However, because the PSET must handle different PMODEs and colors, the code is much longer than necessary for a special 256-by-192 case. Most importantly, the code in the complete PSET (not shown) has a great deal of overhead for syntax checking and argument evaluation as well. A figure of 2,000 microseconds per point is about 300 instructions for each PSET, but it's easy to see where this time is spent! Unfortunately, I didn't consider all of the aspects of this syntax checking and argument evaluation when I first looked at the problem, but more about that soon.

Rolling Your Own PSET

Considering the time that PSET takes in BASIC, it certainly seems that we should be able to implement our own assembly language subroutine to duplicate the action of PSET or PRESET at a much faster rate. We are not burdened by the overhead functions of syntax checking and would not have to spend time in finding the arguments either (at least that was my original theory and it's partially true).

What would be the absolute fastest code to set a point on a 256-by-192 element screen? One way that came to mind was to use a table of 49,152 addresses, each address corresponding to the screen location of the byte containing the pixel involved (see Figure 3). As each address would have to be two bytes, the table would be 98,304 bytes long. In addition to the address table, we'd have a mask table of 49,152 entries, each entry a single byte in length, and corresponding to the proper bit mask for a given X, Y. However, the size of the tables exceeds the addressing range of the 6809! Even with an extended addressing range, the displacement from the table start would exceed the maximum 16-bit value — a Y,X of \$A080 representing Y,X = 160, 128, for example, would require a displacement address of \$14100 (remember, there are two bytes per entry). This is a pity, as it would make for a fast PSET, something like:

```
PSET     LDD    YX          get Y,X values
         ADD    YX          x 2, but possible overflow!
         TFR    X           save in X - may be too large
         CLRA               zero A
         LDB    X           X now in D
         TFR    D,Y         save in Y
         LDA    [ADDTAB,X]  get byte
         ORA    [MSKTAB,Y]  set bit
         STA    [ADDTAB,X]  restore
         RTS                return
```

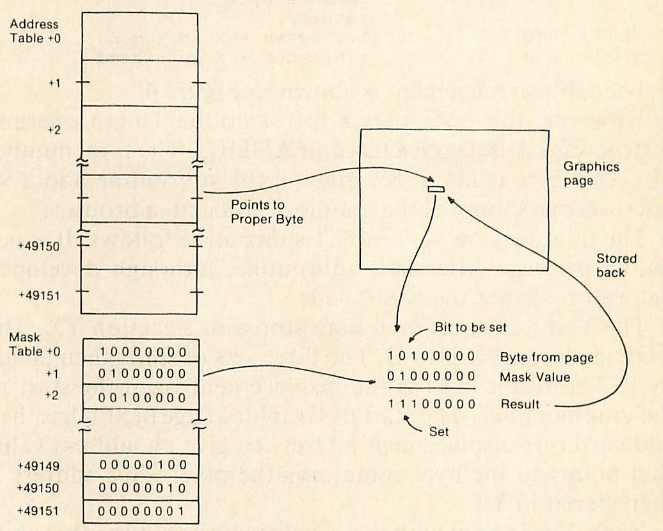

Figure 3: Fast PSET Scheme

Outside of taking a horrendous amount of memory, and the fact that it doesn't work, it's a good idea for systems like the CoCo 3 with 512K bytes of cheap memory. Maybe a modification of splitting the address table into two parts would work.

What about a modification with a more manageable table?

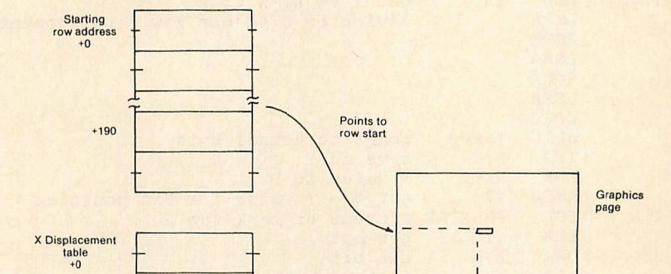

Figure 4: Modified Fast PSET Scheme

If we had a table containing the addresses of all of the starting rows, a second table for the displacements for an X within the row, and a third table for the mask for every X, we could use this code to do the PSET:

```
PSET    LDD    XLOC        get X location
        ADDD   XLOC        times 2
        TFR    D,X         now in X
        LDD    YLOC        get Y location
        ADDD   YLOC        times 2
        TFR    D,Y         now in Y
        LDD    YTAB,Y      get starting row address
        ADDD   XTAB,Y      add in X displacement
        TFR    D,Y         now in Y
        LDA    ,Y          get byte
        ORA    MSKTAB,X    set bit
        STA    ,Y          restore byte
        RTS                return
XLOC    RMB    2           two bytes - X in second
YLOC    RMB    2           two bytes - Y in second
```

The table arrangement is shown in Figure 4.

However, this code uses a lot of double-length operand instructions — lots of LDDs and ADDDs. The total number of cycles here is about 85, making the subroutine about 96 microseconds long. Is there a more efficient subroutine?

The final version of the PSET subroutine follows. It is not unlike the core Microsoft subroutine, although developed before I reviewed the BASIC code.

The Y and X coordinates are stored in Location YX. The LDD picks up YX into D. The three sets of shifts then divide by 8. The result in D is the displacement from the start of the graphics page. The start of Graphics Page 0, $E00, is then added to this displacement address to give an address value that points to the byte containing the pixel. This address is then stored in Y.

Next, X is loaded with the X value and the lower three bits are masked through to B. Register X is then loaded with the address of the mask table.

The byte containing the pixel is loaded into A by the LDA, Y. The proper bit is set by doing an ORA B,X, which adds the value of 0 to 7 in B with the address of MSKTAB to get an effective address pointing to the mask value. The mask value is then ORed to set the bit. The result in A is then stored back to the byte and an RTS is done to return.

```
        ORG    $3F00
PSET    LDD    YX        get Y to A, X to B
        LSRA             divide by 8 to get row displacement
        RORB
        LSRA
        RORB
        LSRA
        RORB
        ADDD   #$E00     point to actual byte
        TFR    D,Y       save in Y
        LDB    YX+1      X value to B
        ANDB   #7        get 0 - 7 value for bit position
        LDX    #MSKTAB address of mask table
        LDA    ,Y        get byte
        ORA    B,X       set bit
        STA    ,Y        restore byte
        RTS              return
MSKTAB FCB    $80
        FCB    $40
        FCB    $20
        FCB    $10
        FCB    $08
        FCB    $04
        FCB    $02
        FCB    $01
YX      RMB    2         Y, X in reverse order
        END
```

This subroutine takes 56 cycles and is therefore about 34 percent faster than the previous version without having the additional memory requirement of 1,152 bytes worth of tables. The subroutine is not relocatable in this version. It is shown in Listing 1 incorporated in a BASIC program to clear the screen.

```
100 ' BENCHMARK FOR PSET SUBROUT
INE
110 CLEAR 100, &H3EFF
120 DEFUSR0=&H3F00
130 DATA &HFC,&H3F,&H25,&H44,&H5
6,&H44,&H56,&H44
140 DATA &H56,&HC3,&H0E,&H00,&H1
F,&H02,&HF6,&H3F,&H26
150 DATA &HC4,&H07,&H8E,&H3F,&H1
D,&HA6,&HA4,&HAA
160 DATA &H85,&HA7,&HA4,&H39,&H8
0,&H40,&H20,&H10
170 DATA &H08,&H04,&H02,&H01
180 FOR I=&H3F00 TO &H3F24
190 READ A: POKE I,A
200 NEXT I
210 SCREEN 1,0
220 PMODE 4,1
230 PCLS
240 TIME1=TIMER
250 FOR X=0 TO 255
260 FOR Y=0 TO 191
270 POKE &H3F25,Y: POKE &H3F26,X
280 A=USR0(0)
290 NEXT Y
300 NEXT X
310 TIME1=TIMER - TIME1
320 IF TIME1<0 THEN TIME1 = 6553
6+TIME1
330 PRINT "TIME-"; TIME1/60
```

And therein lies the second part of this story. Although the assembly PSET is indeed 2½ times as fast as the "core" assembly language code in Microsoft BASIC, it is only that fast when not called from BASIC. When I ran the program in Listing 1, I was horrified to discover that the program took about 574 seconds, 326 seconds longer than the plain vanilla PSET version. Why? The extra time was created by the two pokes to set up the X and Y parameters and by the USR call itself. BASIC overhead for evaluating arguments adds considerable time to the execution of the code. The upshot of this is that the assembly language code can be used stand-alone with other assembly language code, but when called from BASIC will take 2.3 times longer than PSET. It taught me that innocuous BASIC statements can take a great deal of time compared to assembly language subroutines that are a lot more efficient. Score one for Microsoft.

The PRESET version to clear points is a separate subroutine and is shown in the code below. The only differences between the two subroutines is that the mask table in PRESET is a 0 for the bit to be reset and that the mask value is ANDed with the contents of the byte.

Both versions work for 256-by-192 mode (PMODE 4) for Graphics Screen 1 on a disk system.

```
PSET    LDD    YX        get Y to A, X to B
        LSRA             divide by 8 to get row displacement
        RORB
        LSRA
        RORB
        LSRA
        RORB
        ADDD   #$E00     point to actual byte
        TFR    D,Y       save in Y
        LDB    YX+1      X value to B
        ANDB   #7        get 0 - 7 value for bit position
        LDX    #MSKTAB address of mask table
        LDA    ,Y        get byte
        AND    B,X       reset bit
        STA    ,Y        restore byte
        RTS              return
MSKTAB FCB    $7F
        FCB    $BF
        FCB    $DF
        FCB    $EF
        FCB    $F7
        FCB    $FB
        FCB    $FD
        FCB    $FE
XY      RMB    2         Y, X in reverse order
```

What good is an assembly language PSET subroutine that is actually slower than BASIC's PSET? When this code is used by itself, it is fast and can therefore be used to construct your own line and graphics shape subroutines. More about those in the next column.

So until you write that 10-microsecond PSET, keep on assemblin'.

RAINBOWTECH

BASIC09
OS-9

BITS AND BYTES OF BASIC

Dealing With Variables In BASIC09

By Richard A. White
Rainbow Contributing Editor

All programs deal with data in some way and there must be ways to store, retrieve and use this data. Conventional BASICs have variable tables in which the variable's name is associated with values if the data is numbers or, if the data is a string, the table keeps the location of the string and its length. When a string variable is changed, BASIC writes the string to a free area of string space and changes the string variable table to reflect the new location and length. The old string is forgotten and its space is unused. Periodically, BASIC runs out of string space and program execution stops while the forgotten strings are found and active strings are moved into their space, freeing a memory block for new storage.

This can be pretty handy for a programmer; he doesn't need to worry about string length, provided it does not exceed about 250 bytes. Further, BASIC uses only what it needs of string space, so memory is conserved. Nearly all other languages require that the programmer declare the variable type and, if it is a string, its maximum length. Storage space is then assigned to each variable and is unchangeable once program execution starts. BASIC09 works this way.

There are a number of advantages to doing things this way. The programmer may use the simple data types to build complex data structures. These complex structures can then be used in definition of an array that uses a very large block of memory. Instead of saving each member of the array or each individual variable comprising the data structure individually to a disk file, the memory block can be written directly to disk. BASIC09 does not care what is stored in the block. All it does is grab bytes and shove them to the disk as fast as it can, which is pretty fast. It's just as fast loading in, too. Since each byte has its own place in the memory block, BASIC09 finds the right value for each variable it looks for individually. To make this possible, the programmer has to understand data types and how to build with them.

There are five basic or "atomic" data types in BASIC09, which are also found in many other languages. Byte, integer and real data types deal with numbers. A string type holds a string of characters. Boolean is a one-byte variable that can only be either true or false.

BASIC09 allocates variable storage space in memory based either on dimension statements, which declare the variable name, type and (in the case of string) the length, or by a default when the variable is first used in the program. Following are some typical variable declarations:

```
0000  DIM count1,count2:INTEGER
000B  DIM buff:STRING[2000]
0017  DIM line:STRING[100]
```

Note that more than one variable may be dimensioned in a line as long as the variable names are separated by commas. Some more complex examples follow. The number in the square brackets after `STRING` is the string length. The square brackets must be used and are generated by pressing the CLEAR key and the left or right parenthesis keys.

```
0090  DIM smwords,mdwords,lg
      words,bgwords:INTEGER
00A3  DIM smstwords,mdstwords,
      lgstwords,bgstwords:
      INTEGER
00B7  DIM length,count,value,
      patho,pathi:INTEGER
00CE  DIM char:STRING[1]
00DB  DIM filein,fileout:STRING
      [16]
```

Richard White lives in Fairfield, Ohio, has a long background with microcomputers and specializes in BASIC programming. With Don Dollberg, he is the coauthor of the TIMS *database management program.*

Obviously, a byte-type variable is one *byte in size*. It can store positive whole numbers in the range of zero to 255. Its primary value is memory economy. There is no computation advantage, since byte variables are always converted to integer or real values for computation.

Integer variables use two bytes of memory. The number stored may be positive or negative and be in the range of -32,768 to 32,767. Integer variables should be real workhorses in your programs. Though restricted to whole numbers, integer math is fast. It's the natural language of your 6809 microprocesser. Integers make great counters in `FOR-TO-NEXT` and other looping structures available in BASIC09.

It is important to keep in mind their limits when using byte and integer variables. First, it is possible to assign a number stored in an integer variable to a byte variable. Provided the number is positive and less than 256, all will be well since the least significant eight bits of the integer are stored. The most significant eight bits, those that help define a number greater than 255 or a negative number, go into the bit bucket and disappear for all time. No error results.

Arithmetic operations can cause values outside the integer range. This causes a "wrap around." For example, 32,767 + 1 = -32,768. Although these results are predictable, they are confusing, so it is best to avoid trouble in the first place. When there is a chance the limits of integer math will be exceeded, use real variables.

Division of one integer by another yields an integer result with any remainder discarded.

Any undeclared numeric variables default to real type. A variable can also be declared real at the outset, which is the best practice from a program clarity viewpoint. Real variables use five bytes of storage. They include the range from 2.938735877 * 10^-39 to 1.0701411835 * 10^38. Operations that exceed the range will cause either an overflow or underflow error.

Real number or floating-point decimal calculations in a computer are never exact. There are certain to be errors in the 10th digit, and the ninth digit is suspect in some operations. This can mean that a number computed one way can look identical to a number computed another way, while a comparison made by the computer will say they are different. This is because the numbers were rounded differently in the different operations. Programmers need to be cautious about making strict comparisons (i.e., = or <>) between real numbers.

A string is a variable length sequence of characters. The string can have zero length, in which case it is empty and is sometimes called a null, or nil, string. Strings can be dimensioned from one character in length up to memory limits. The string length assigned in the dimension statement only assigns memory space for that string. The actual length of the string itself may vary from zero up to the space assigned. This raises some significant memory conservation questions.

Say you write a simple note-taking program and allow a separate string variable for each of twenty 80-character lines. You have just committed 1,600 bytes of memory and have yet to enter a character. If you null each string and individually write them to a disk file as variable length ASCII strings, the file will be very short. Use the program to enter some notes and save the file, and it will be the length of text stored plus an ASCII null character ($00) between each string. If, on the other hand, you put the file to disk under a single array name, a full 1,600 bytes (mostly garbage) will be in the disk file.

A possible way around this is to define a very long string and treat it as a buffer, storing shorter strings in sequence somewhat like conventional BASICs do. Of course you need to work out how to manage the buffer and its data yourself. This is demonstrated by Listing 1.

The string `buff` is dimensioned 2000 characters long. The first three `FOR-TO-NEXT` loops simply load letters and numbers (in character format) into the string `buff`, more than half filling it. The fourth `FOR-TO-NEXT` simply gets 100-byte sections of the string `buff` and sends them to the screen to demonstrate that long strings actually work. Using `ADDR`*name* you have the program find the start of the string in memory and peek and poke at it. Of course, these types of activities are not for the novice programmer.

Note that the two strings, `buff` and `line`, were initialized at the beginning of the program. In the case of `buff`, it was essential to start with an empty string; a dimensioned-only string is sure to contain garbage. Because we always make an assignment to `line`, it could have been uninitialized. Neither of the count variables were initialized since `FOR-TO-NEXT` handles that chore.

Listing 1:

```
PROCEDURE longstring
0000  DIM count1,count2:INTEGER
000B  DIM buff:STRING[2000]
0017  DIM line:STRING[100]
0023
0024  buff:=""
002B  line:=""
0032
0033  FOR count1=1 TO 100
0043  buff:=buff+"a"+STR$(count1)
0054  NEXT count1
005F
0060  FOR count1=1 TO 100
0070  buff:=buff+"b"+STR$(count1)
0081  NEXT count1
008C
008D  FOR count1=1 TO 200
009D  buff:=buff+"c"+STR$(count1)
00AE  NEXT count1
00B9
00BA  FOR count1=0 TO 10
00CA  line=MID$(buff,count1*100,100)
00DB  PRINT line
00E0  FOR count2=1 TO 2000
00F1  NEXT count2
00FC  NEXT count1
0107
0108  END
```

Finally, there is the Boolean type, which is essentially a true or false flag that BASIC09 understands. When Boolean values are printed, they appear as true and false.

Occasionally, it is necessary to mix numeric variables of different types in a calculation. In this case, values are automatically converted to the largest type needed to retain accuracy. But type conversion takes time, so keeping to a single type in an expression has merit.

Arrays of variables are data structures in which a number of items of data are stored under a single variable name. Here are some examples:

```
DIM words(100):STRING[16]
DIM each_sale(200):REAL
DIM bowling_scores(3):IN
   TEGER
```

These statements make room for a 100-word list, 200 sales and three bowling scores. The individual member of an array is accessed by the array name and the number of the member. The member number may be assigned to a variable; perhaps in a loop that is printing the array, the member number could be the loop counter.

```
FOR count1=1 to 20
PRINT student_name(count1)
NEXT count1
```

The preceding arrays have one dimension. Two- and three-dimension arrays are also possible under BASIC09. If you think of a single-dimensioned array as a numbered list, then two- or three-dimensioned arrays can be thought of as added columns or lists to the right.

```
DIM sales(100,100,100):REAL
```

In this example, the first dimension could be the sale, the second the sales tax and the third the total.

The `TYPE` statement is used to define a list of variables to be associated together. For example, let's consider writing a program to store phone numbers. Three pieces of information are needed at minimum. These are first name, last name and phone number. The list might be sorted by last name, which is why first and last names are stored separately. We want these three pieces of data stored together as a record. They can be set up as a complex data type.

```
TYPE phone_rec = first,last:
STRING[16]; phone:STRING[12]
```

This says that the variable `phone_rec` is a complex type made of two 16-character strings named `first` and `last` and the 12-character string named `phone`. This only established the type for data structure and has not dimensioned it. The next step is to dimension an array to hold the records.

```
DIM phone_list(100):phone_rec
```

Since `first` and `last` each have space for 16 characters and `phone` allocates 12 more, each member of the array `phone_list( )`will need 44 bytes, and the whole array will use 4,400 bytes.

Here is a somewhat more complex example. I wrote a program to store advancement and badge awards for a local scout troop. A major reason for doing this in BASIC09 was that it afforded me a way to print customized reports for each scout showing only those advancements and awards actually earned and the dates of the awards. The record for each boy must keep track of 10 ranks, 12 skill awards and 118 merit badges, along with the name of the boy, the date joined and his patrol. This is not something to do in a spreadsheet, and none of my file manager programs would handle the specialized reports. This is where the `TYPE` statement really shines.

```
TYPE rec = last,first,patrol,:
STRING[12];
   joined,rdate(10),sadate(12)
  ,mbdate(120):STRING[8]
DIM scout:rec
```

All the eight-character strings are intended to store a date in the form of YY/MM/DD. Note also how easily arrays are included. The `rdate( )` array is for rank, `sadate( )` is for skill awards and `mbdate( )` is for merit badges. Only a single variable, `scout`, is dimensioned. It's big — over 1,000 bytes. So I store the records on disk and only work with one or two at a time.

To show how individual fields in the record are accessed, here is the code to select and print merit badges and the dates they were awarded.

```
FOR count1=1 TO 118
 IF scout.mbdate(count1)>"" THEN
  PRINT #pr USING "X12,S30<,S8
  <",mb(count1),
   scout.mbdate(count1)
  count3:=count3+1
 ENDIF
NEXT count1
```

Since there are 118 merit badges, the scout's merit badge date field for each badge must be checked. This field is described to BASIC09 by the variable name, `scout`, a period and the array name, `mbdate(count1)`. In most instances the `mbdate` member is null. When there is a date in the field, the name of the merit badge is printed from the separate `mb( )` array followed by the date from the `scout.mbdate( )` array. The variable `count3` keeps track of the number of lines printed for pagination purposes.

Note how neatly the `IF-THEN-ENDIF` lays out. There is really no limit on how much code can go after `THEN` or `ELSE`. In conventional BASIC all the code associated with `IF-THEN-ELSE` must be on one numbered line. BASIC09's control structures provide a rich set of tools to do top down programming. We'll take up this topic when we return to BASIC09 after a tour of the new commands in CoCo 3 BASIC.

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KISSable OS-9

A Bundle of Holiday Goodies

By Dale L. Puckett
Rainbow Contributing Editor

Early this year Stephen Goldberg of 695 Plainview Road, Bethpage, NY 11714, started distributing *Utilipak* — a very handy package containing nearly two dozen OS-9 utilities. Later in the year he updated the package to make everything compatible with OS-9 Level I, Version 2.00.00. Now, just in time for Christmas, he's offering *Utilipak Too.*

Utilipak Too features a number of programs that were supposed to be included in *Utilipak.* Unfortunately, according to Goldberg, there wasn't enough room on the contents page. The price for *Utilipak Too* is right, just $12, and you can still buy the original *Utilipak* for $25. And, Goldberg says the Pack, Unpack and Crypt utilities now work much faster.

The utilities include Bootfix, Cls, Copy, D, Deiniz, Del, List, Page, Rep, Update and Unload. Bootfix will be especially handy for Disk BASIC 1.0 users who own single-sided disk drives. It combines the Disk BASIC boot program with a system disk and lets you boot OS-9 from Disk BASIC with a single disk.

While Cls merely clears the screen, it is much faster than typing `display c`.

Copy uses the same syntax as the original Tandy `copy` command, however it lets you overwrite an existing file if you desire. It also reduces the number of exchanges required for disk-to-disk copies on single-drive systems and gives better error management.

D is the unformatted directory utility from the original *Utilipak.* It is included in this package so you can use it with Del and Rep. Deiniz, Rep and Unload have all been published in this column during the past year. However, the versions that come on the *Utilipak Too* disk have improved error handling.

Del directly replaces both the original Tandy `del` command and the *DL* utilities, saving you some disk space. This Del duplicates the syntax of both of these, and also features improved error handling.

Update is a simple one-step replacement for the Tandy `verify` utility. With Update you don't have to remember to request the 'U' option on your command line. The *Utilipak Too* List utility optionally prints line numbers if you request them on your command line. Also, this list will not fill your screen with garbage if you try to list a file containing an OS-9 module. Along the same lines, Page gives you a paginating filter utility program that prints optional page numbers and headers. It also lets you set the page length and pause at the end of each page if you desire.

You can hear sleigh bells in many places this time of year. And if you install this patch from Goldberg, you will hear bells more often while running OS-9.

Change the byte at Offset $639 Hex in the module IOMan to a 7. After you do this, every time OS-9 reports an error you will hear a beep. If you change the byte at $617 Hex in ASM to a 7, that program will also sound off.

After you make these changes with `debug` you can make them permanent by saving the modified modules. If you do this, don't forget to verify them with the U option or run the new Update utility from *Utilipak Too.*

Another Request for Config Help

Nick Molfese of South Holland, Ill., sent me a question about the new `config` utility that comes with OS-9 Level I, Version 2.00.00. Since a lot of people are still having problems running `config`, we thought it would be good to take another look at it here.

Just about everyone having trouble getting `config` to run properly receives a #216 (File Not Found) Error. Here's the reason. When you insert the `config` disk to run it, you must change both the current data directory and current execution directory. If you have a single-disk system, remove the OS-9 system disk and insert a working copy of the `config` disk. Then type the following OS-9 command lines to run `config`:

```
OS9: chx /d0/cmds          ENTER
OS9: chd /d0               ENTER
OS9: Config                ENTER
```

I think you'll really enjoy this handy utility. If you buy BASIC09 sometime in the near future, here's another quick tip. You must go through the same procedure to run BASIC09 with a single-drive system. First, take out the OS-9 system

---

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disk. Then, insert the BASIC09 disk in the drive. With BASIC09, you must type the following OS-9 command lines:

```
OS9: chx /d0                    ENTER
OS9: chd /d0                    ENTER
OS9: basic09                    ENTER
```

Notice that in this sequence you did not set the current execution directory to /d0/CMDS. That's very unusual. But you must do it because Tandy has stored BASIC09 in the root directory of the distribution disk. This means if you insert a working backup of that disk in drive /d0, BASIC09 is stored in the root directory — or /d0.

More Version 2.00.00 Tips

Howard Luckey of Park Forest, Ill., wasn't so lucky when he tried to run some of the procedure files listed in the *Complete Rainbow Guide to OS-9*. Unfortunately, I was unable to duplicate his problem with the `tee` command. He received a #215 (Bad Pathname) Error when he ran the sample command line:

```
OS9: list /d0/startup ! tee /p
/d1/test_directory/scratch
```

I suspect that Howard misspelled the name of the test directory when he created it or that he did not have a device named `/p` or `/d1` installed when he ran the sample. Misspelling the name of a device would also cause a #215 Error.

Many of you may have run up against the other problem Howard noticed. When he used the procedures on pages 145 to 150 of our book using Version 2.00.00 of OS-9, everything worked fine. Unfortunately, however, when he tried to boot his new disk he ran into a major problem — it wouldn't work.

Howard was on the right track and checked the CRC of the modules in his new OS-9 boot file. He found two that were bad. What happened?

During one of the steps in the procedure files, you save, into a special directory, the modules in memory that you want in the new boot file. Later, you use `OS9Gen` to place them in a new file named `OS9Boot`.

Unfortunately with Version 2.00.00, the code in the modules CCIO and CO32 or CO80 are modified as soon as you start your system. If you save them from memory, you will have saved a module with a bad CRC.

The solution is to use the copy of CCIO and CO32 or CO80 that come in the MODULES directory on your `config` disk. They haven't been modified and will work fine. Another example later in the same chapter shows how to use other files with `OS9Gen` to create a new `OS9Boot`.

> ***"Some say it is confusing to have a floppy be* `d0` *and a hard disk be* `d0`*. I say it is less confusing than having the root device be either* `h0` *or* `d0` *depending on how I booted."***

Having a Ball!

Last month we recommended you download the Ball Demo from Steve Bjork in the OS-9 section of the Color Computer SIG database on Delphi. A few days ago we received a note from Fred Sawtelle with a neat trick you can do with that demo.

"*Ball* has two documented options, -s and -f, but it also has a -u option," Sawtelle said. "Try that one! And put an ampersand (&) on the end of your command line.

"After you start the demo, type `display 0f0005` and press ENTER. By using this line and `display e` you can toggle the graphics mode," he said. "Hold down the BREAK key and watch what happens. To freeze the screen, type `kill 3`, or whatever *Ball*'s procedure number is on your CoCo."

Once Sawtelle had stopped the demo, he was able to send the image to his printer. His son wanted to show it to his geography teacher. Thanks for the tip, Fred.

Free OS-9 Details

We have mentioned that there was a bonanza of information available in the files in your OS9DEFS directory. Several people have asked us how they can get to that information. Probably the most effective way is to assemble them using the OS-9 assembler, ASM. First, build a short file named `asmdefs`.

```
OS9: build asmdefs              ENTER
? opt l                         ENTER
? use /d0/defs/os9defs          ENTER
? use /d0/defs/scfdefs          ENTER
? use /d0/defs/rbfdefs          ENTER
?use /d0/defs/systype           ENTER
?                               ENTER
```

After you have typed this file, assemble it with this command line:

```
OS9: asm asmdefs l #20K >/p
```

Note that the `l` is a lowercase 'L', not a numeral one. This command line prints a formatted listing that shows the names of all the internal variables in OS-9. Enjoy!

One-Liner Contest Winner . . .

Resist calculates the equivalent resistance of any number of parallel resistors.

The listing:

```
10 C=0:INPUT"HOW MANY RESISTORS"
;A:IFA<1THEN10ELSEFORX=1 TO A:PR
INT"RESISTOR#"X"(OHMS)";:INPUT R
(X):IFR(X)<=0THENPRINT"RT=0 OHMS
":GOTO10ELSEC=C+1/R(X):NEXTX:PRI
NT"RT="1/C"OHMS":GOTO10
```

Joseph Ferullo
Revere, MA

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book of Simulations* and its companion *The Rainbow Simulations Tape*.)

A Quick Correction

In the September column a typo slipped into one line of the BASIC09 Procedure Printer listing. Here is the correction.

```
Bad line:     run gfx(″gcolr″,x
              ,y-pin,color)
Correct line: run gfx(″gcolr″,x
              ,y,pin,color)
```

Another Nifty Trick From Greg Law

Would you rather test a procedure file while you're typing? Try this:

```
OS9: ex shell t -p >>new
procedurefile                ENTER
```

This command line creates a shell that echoes your command lines and does not print any prompts. Since you have redirected the standard error output path to a file, you will wind up with a file that will run as a procedure file. If each command line you typed ran perfectly when you typed it live, it will run properly from the script, `new procedurefile`. If, however, you ran into an error with your typing, you will need to edit `newprocedurefile`. Since you actually ran the code you typed, you'll know which typos need to be fixed. Nifty!

More On Standards

Cornelius Seon sent us a note recently about a technique he thinks should become a standard. He pointed to the Computerware/Tandy program *OS-9 Profile* and endorsed programmer Brian Lantz's technique.

"*Profile* uses the OS-9 `makdir` utility to make a data directory in the current data directory for each database you create. The filename you give to *Profile* becomes the name of a new directory," Seon said. "The files in this directory are data files, the names of which are symbols that describe what each file contains. Each directory also contains the screens, indexes, reports and format files needed by *OS-9 Profile.*"

Another nice note came our way from Carl Kreider this month. Kreider is the chairman of the OS-9 Users Group Software Committee and, among other things, a real programming genius. If you scan the programs in the Users Group's library you will find he is the author of many of them.

"I have never had to use `h0` as the name for my hard disk," Kreider writes. "My system normally boots on its hard disk as `d0`, but I had to boot from a floppy until I cut a PROM with the boot code for my new 31-megabyte drive. Here's the procedure.

"In your modules directory, rename your floppy descriptors with a suffix of `.f`. Copy `d0.f` to `d1.h` and patch its name to be `d1`. Repeat for other necessary floppy descriptors.

"Then, copy `h0` to `d0.h` and patch its name to be `d0`. Build a new boot file using the new descriptors. I like to keep a vertical list of modules in files named `hardmods` and `floppymods`. They can be used with `cat` and `install` or as input to `OS9Gen` to build a new boot file."

Kreider reports that using the new boot file brings the system up on the hard disk with the hard disk as `d0`. After you do this, your software will have no problem finding `/d0/defs`, or other files hard coded in programs that assume they are stored on Drive `/d0`.

"I feel rather strongly that the root device should be named `d0` just to avoid the problems you discussed in your column," Kreider said. "Some say it is confusing to have a floppy be `d0` and a hard disk be `d0`. I say it is less confusing than having the root device be either `h0` or `d0` depending on how I booted.

"After all, is not the `..../defs` hack just an attempt to find the root device?" Kreider asked. "Let's make it easy and always call it `d0`. I have practiced what I preach since my first hard disk four years ago, even on a CoCo. This technique is so simple that I would be foolish to claim originality, but I am surprised that it has not been mentioned in the press."

Thanks for the tip Carl. I think a lot of CoCo OS-9 hackers are going to have fun experimenting.

This Month's Listings

Fred Sawtelle sent us a real holiday present this month. We are printing four interesting utilities written in OS-9 assembly language. We've saved two more for the New Year.

This month you can study and try `del`, `dname`, `exit` and `time`. The `del` is an improved delete utility. It expects a space between filenames and interprets a carriage return as the end of the file list. This means that a list of filenames, one to a line, won't work. But, you can flush a directory by piping the output of `dir` to Sawtelle's `del`. When you do, don't be surprised when you see:

```
DEL: can't find directory
DEL: can't find of
DEL: can't find .
DEL: can't find 06:08:59
```

After these messages it will go ahead and delete the files in your directory.

The `dname` gives you a way to change the name of the volume stored on a disk. `exit` lets you return to Radio Shack Disk BASIC smoothly. And finally, `time` gives you a way to print the time without the date.

Happy Holidays

I hope this column has given you a few ideas or answered a few questions. I hope also that your holiday season will be the best ever. Until next year, keep on hacking. ☐

Listing 1: `del`

```
*------------------------------*
*            DEL               *
* an Improved Delete Utility   *
*------------------------------*
*     (C) Copyright 1986       *
*       by Fred Sawtelle       *
*    3103 Montgomery Road      *
*    Huntsville, TX 77340      *
*         June 16, 1986        *
*------------------------------*

 nam DEL
 ttl an Improved Delete Utility

 ifp1
 use /d0/defs/os9defs
 endc

* CONDITION: use /d0/defs/os9defs

SKIP2 equ $8c

*---- MODULE SPECS ----

TYP set prgrm+objct
REV set reent+1
 mod ZZ,MN,TYP,REV,GO,EDAT
MN fcs "del"
 fcb 1 :version

*---- DATA SPECS ----

FLAG rmb 1
```

```
LASTNAME rmb 2
BUFFER rmb 400
EDAT equ .

*---- STRINGS, ETC. ----

SNTXMSG fcc "USE: DEL [-x] pathname [...]"
 fcb $0a
 fcc "  or get pathnames from standard input."
 fcb $0a
 fcc "  -x option = use execution directory."
 fcb $0d
SEND equ *

FINDMSG fcb 7
 fcc "DEL: Can't find "
FEND equ *

*---- EXECUTABLE CODE ----

GO clr ,u :=stdin
 lda ,x
 cmpa #$0d
 beq STDINPUT
 cmpa #'?
 beq SYNTAX
 inc ,u :=path in param area
 cmpa #'-
 bne DELETE
 ldd ,x++
 andb #$df
 cmpb #'X
 beq XDELETE

SYNTAX leax SNTXMSG,pcr
 ldy #SEND-SNTXMSG
 lda #1
 bsr WRITE
 bra OUT

*---- STANDARD INPUT ----

STDINPUT leax BUFFER,u
 clra
 ldy #200
 os9 i$readln
 bcs ERROR
 lda ,x
 cmpa #$0d
 beq OUT
 fcb SKIP2
```

```
XDELETE com ,u

DELETE lda ,u
 bmi EXDIR
 os9 i$delete
DEL1 bcs DELERR
DEL2 lda ,x
 cmpa #$0d
 bne DELETE
 lda ,u
 beq STDINPUT
 bra OUT

EXDIR os9 i$deletx
 bra DEL1

ERROR cmpb #e$eof
 bne EROUT
OUT clrb
EROUT os9 f$exit

WRITERR lda #2
WRITE os9 i$writln
 bcs EROUT
 rts

DELERR stx LASTNAME,u
 leax FINDMSG,pcr
 ldy #FEND-FINDMSG
 bsr WRITERR
 ldx LASTNAME,u
 clrb

D1 incb
 lda ,x+
 cmpa #$20
 beq D2
 cmpa #$0d
 bne D1
 leax -1,x
 pshs x
 clra
 tfr d,y
 ldx LASTNAME,u
 bsr WRITERR
 puls x
 bra DEL2

D2 lda -1,x
 pshs a,x
 lda #$0d
```

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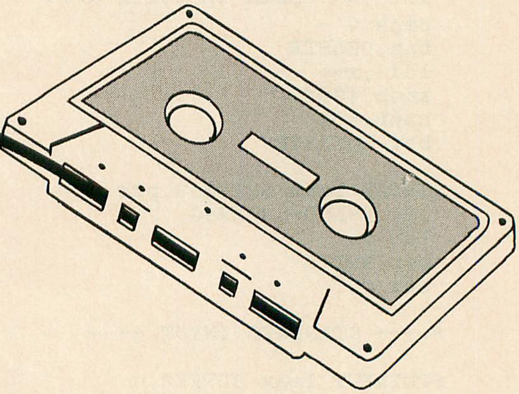

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December 1985 — *Rudolph*, a graphics and music storytelling program; *Christmas Songs*, computerized chimes that ring out seasonal tunes; *Remote Burglar Alarm, Part I*, a computerized alarm system for the home; *Trivia Tic-Tac-Toe*, a multiple-choice game where a correct answer gives an 'X' or 'O'; *Puzzle*, an educational word search puzzle game; *CoBBS*, part two of a complete bulletin board system; *Awards*, a Ham utility that keeps track of various awards for Ham radio operators; *Brain Games*, five programs combined to challenge your insight and memory; *Menorah*, a graphics program that illustrates and gives a short history lesson on the lighting of the menorah candles; *Alpine Slopes*, an action game that shows the techniques of programming with 4K; and *Christmas Show*, a graphics program that displays various holiday scenes accompanied with seasonal tunes.

December 1984 — *Holly Jolly Holidays*, a program that consists of a series of holiday scenes each followed by an appropriate holiday song; *Handler*, the second of three parts on diskette file organization; *Christmas Card File and Labeler*, an aid in preparing holiday greetings; *Season's Greetings*, a graphics program that displays an animated, holiday greeting; *Rescue on Alpha II*, the graphics winner from The Second RAINBOW Adventure Contest; *The Head of the Beast*, the 16K winner from The Second RAINBOW Adventure Contest; *Season's Greeting Cards*, a program to create computerized multicolor greeting cards; *128K The Easy Way*, a tutorial on expanding CoCo's memory; *Encyclopedia*, a program to help students seek information from the CoCo; *Football Fever, Part II*, a graphics program to create AFC helmet pictures; and *Personable Pascal*, a program to manage a Christmas gift list.

```
 sta -1,x
 ldx LASTNAME,u
 clra
 tfr d,y
 bsr WRITERR
 puls a,x
```

```
 sta -1,x
 bra DEL2

 emod
ZZ equ *
 end
```

Listing 2: dname

```
*-----------------------------*
*            DNAME            *
*-----------------------------*
* Change Diskette Volume Name *
*-----------------------------*
*     (C) Copyright 1986      *
*      by Fred Sawtelle       *
*    3103 Montgomery Road     *
*    Huntsville, TX 77340     *
*      February 7, 1986       *
*-----------------------------*

 nam Dname
 ttl Change Diskette Volume Name

 ifpl
 use /d0/defs/defsfile
 endc

* CONDITION:  use /d0/defs/defsfile

*---- MODULE DEFINITION ----

TYP set prgrm+objct
REV set reent+1
 mod ZZ,MN,TYP,REV,GO,EDAT
MN fcs "Dname"
EDITION fcb 4
 fcc "(C)1986FredSawtelle"

*---- DATA MEMORY AREA ----

 rmb dd.opt :input buffer
PATH rmb 1 :pathname
RENAMFLG rmb 1 :rename or not?
NEWNAME rmb 2 :new name address
BUFFADR rmb 2 :free string area
STRINGS rmb 200 :device name$
EDAT equ .

*---- EXECUTABLE CODE ----

OPEN leax STRINGS,u :index device
OP1 lda #updat. :get access mode
 os9 i$open :open device
 bcs EROUT
 sta PATH :save path number
 rts

FORMAT leax FMMSG,pcr
 ldy #FMEND-FMMSG
 bsr OUTPUT
EXIT clrb :insure no error code
EROUT os9 f$exit

OUTPUT lda #1 :standard output
 os9 i$writln :send message
 bcs EROUT
 rts

 *---- INITIAL ENTRY HERE ----
```

```
GO clr RENAMFLG :for no rename
 leay STRINGS,u
G1 lda ,x :examine parameters
 cmpa #$20 :space?
 bne G2
 leax 1,x
 bra G1

G2 cmpa #$0d :no dev specified?
 beq COPY2
 cmpa #'/ :is it a device?
 bne FORMAT :if not, show format
 os9 f$prsnam :is it ok?
 bcs FORMAT :show proper format
 leay STRINGS,u :Y-index buffer
 leax -1,x :back up to "/"
COPY1 lda ,x+ :transfer devname
 sta ,y+
 decb
 bpl COPY1
COPY2 ldd #$4020 :tell OS9 entire
 std ,y++ : device is a file
 sty BUFFADR

*---- CHECK FOR RENAME ----

 lda ,x+ :Xreg = end of devname
 cmpa #$0d :if cgrtn, then no
 beq READIN : rename wanted.
 cmpa #$20 :space?
 bne FORMAT :only cgrtn, sp ok
SKIPSPCE lda ,x+ :check next chr
 cmpa #$0d :is it cgrtn?
 beq READIN :if so, no rename
 cmpa #$20 :another space?
 beq SKIPSPCE :if yes, loop back
GOTNEW1 leax -1,x :found a name
 stx NEWNAME :so save pointer
 com RENAMFLG :flag a rename

*---- OPEN FOR READ ----

READIN bsr OPEN
 ldy #dd.opt :# bytes to read
 leax ,u :index buffer
 os9 i$read
 bcs EROUT
 os9 i$close

*---- DISPLAY OLD NAME ----

 lda RENAMFLG
 bne MAKENEW
 leax dd.nam,u :point at old name
 ldy BUFFADR
NEXTONE lda ,x+
 bmi LASTONE :if bit 7 set
 sta ,y+
 bra NEXTONE
LASTONE anda #$7f :switch off bit 7
 sta ,y+ :normal for write
 lda #$0d
 sta ,y
 ldx BUFFADR
 ldy #33
 lbsr OUTPUT

*---- TEST FOR RENAME ----

 lda RENAMFLG :do we rename?
 lbeq EXIT :if not, out.

MAKENEW leay dd.nam,u :index old name
 ldx NEWNAME :index new name
 ldb #$1f :max count less 1
MOVENAME lda ,x+
 cmpa #$0d
 beq SETBIT :if string end
 sta ,y+
 decb
 bpl MOVENAME :if not past max
SETBIT lda -1,y :get last chr
 ora #$80 :set bit 7
 sta -1,y :replace it

CLRBYTES decb :past max yet?
 bmi REWRITE :if yes
 clr ,y+ :if not, clear it
 bra CLRBYTES

REWRITE lbsr OPEN
 leax ,u :index buffer
 ldy #dd.opt :get count
 lda PATH
 os9 i$write :output new data
 lbcs EROUT
 os9 i$close
 lbcs EROUT
 lbra EXIT

*---- MESSAGES, DATA ----

FMMSG fcc "USE: DNAME [/device [new name]]"
 fcb $0d
FMEND equ *

 emod
ZZ equ *
 end
```

Listing 3: `exit`

```
*-----------------------------*
*            EXIT             *
*-----------------------------*
*     (C) Copyright 1986      *
*      by Fred Sawtelle       *
*    3103 Montgomery Road     *
*    Huntsville, TX 77340     *
*      February 8, 1986       *
*-----------------------------*

 nam Exit
 ttl from OS-9 to Disk BASIC

* NOTE: Clearly, this is not a
*       time-sharer's utility.

 ifpl
 use /d0/defs/os9defs
 endc
* CONDITION

* use /d0/defs/os9defs

*---- MODULE SPECS ----

TYP set prgrm+objct
REV set reent+objct
 mod ZZ,MN,TYP,REV,GO,EDAT
MN fcs "Exit"
 fcb 2 (edition)
 fcc "(C)1986FredSawtelle"

 *---- DATA SPECS ----

 rmb 200
EDAT equ .

 *---- MODULE EXECUTION ----
GO lda ,x
 anda #$df
 cmpa #'Y
 beq YES
 leax SURE,pcr
 lda #1
 os9 i$writln
 bcs OUT

 ldy #1
 clra
 leax ,u
 os9 i$read
 bcs OUT
 clrb
 lda ,x
 anda #$df
 cmpa #'Y
 bne OUT

YES leax D0,pcr
 bsr TRACK0
 leax D1,pcr
 bsr TRACK0
 leax D2,pcr
 bsr TRACK0
 leax D3,pcr
 bsr TRACK0

OVERRIDE orcc #$50
 leau EXIT,pcr
 cmpu #$8000-(X1-EXIT)
 blo EXIT
 ldx #$1000
 ldb #X1-EXIT
TFR lda ,u+
 sta ,x+
 decb
 bne TFR
 jmp $1000

OUT os9 f$exit

TRACK0 lda #1
 os9 i$open
 bcs OVERRIDE
 ldb #SS.Reset
 os9 i$setstt
 bcs OVERRIDE
 ldx #5
 os9 f$sleep
 bcs OUT
 rts
*---- STRINGS, ETC. ----

D0 fcc "/D0@ "
D1 fcc "/D1@ "
D2 fcc "/D2@ "
D3 fcc "/D3@ "
```

```
SURE fdb $0707
 fcc "EXIT OS9 (y,n)?"
 fcb $0d

*---- THE OS9 TRASHER ----

* NOTE: this may not work with
*   the CoCo Deluxe. It depends
*   on what's been done to Disk
*   Extended BASIC.

EXIT ldx #$71
 sta $ffde
 clr ,x
 jmp [$fffe]
X1 equ *

 emod
ZZ equ *
 end
```

Listing 4: `time`

```
*------------------------------*
*             TIME             *
*------------------------------*
*  Display time without date   *
*  By Fred Sawtelle            *
*------------------------------*

 nam Time
 ifp1
 use /d0/defs/os9defs
 endc

* CONDITION: use /d0/defs/os9defs

*---- MODULE SPECS ----

TYP set prgrm+objct
REV set reent+1
 mod ZZ,MN,TYP,REV,GO,EDAT
MN fcs "Time"

*---- DATA SPECS ----

 rmb 200
EDAT equ .

*---- EXECUTABLE CODE ----

GO tfr u,x
 os9 f$time
 bcs EROUT
 leax 3,x
 leau 3,x
 ldb ,x+
 bsr PROCESS
 lda #':
 sta ,u+
 ldb ,x+
 bsr process
 lda #':
 sta ,u+
 ldb ,x+
 bsr process
 lda #$0d
 sta ,u

 lda #1
 ldy #9
 os9 i$writln
 bcs EROUT
 clrb
EROUT os9 f$exit

PROCESS lda #$2f
 inca
P1 subb #$64
 bcc P1
 sta ,u+
 cmpa #$30
 bne P2
 leau -1,u
P2 lda #$3a
P3 deca
 addb #$0a
 bcc P3
 sta ,u+
 addb #$30
 stb ,u+
 rts

 emod
ZZ equ *
 end
```

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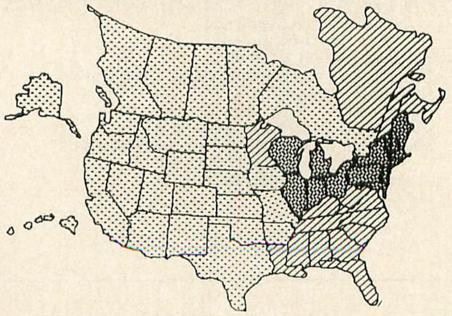

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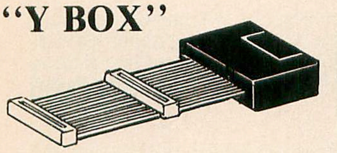

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- 4 page animation mode
- Color Palette with over 15 color patterns for use with Hi-Res artifact
- Send/Receive pictures over modem
- Supplied utility allows capturing Hi-Res screens from most COCO arcade games
- Multiple Hi-Res character fonts (user re-definable)
- Supplied utility for transferring Graphicom screens to Basic or other M/L programs.
- Supplied utility for loading screens from Basic or other sources
- Built in Hi-Res SCREEN PRINT (compatible with EPSON, C-ITOH, GEMINI-10, OKI, plus Radio Shack's LP-VII, LP-VIII, DMP-100, DMP-200, and GCP-115 printers) from 110 to 9600 baud
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- Many additional features, operating hints, hardware mod's and suggestions, etc.

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This program contains some of the popular features found in "HARDCOPY" such as 1x1, 2x2 and posters; but color scan produce full color printouts of your favorite 6K graphics files. You can also create colorful banners up to 27' in length, or dump a disk's entire graphic contents to paper.
Colorscan will print program listings in blazing color, make remarks in red, line numbers green, search for strings and print in blue, etc. All these features and more.
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DISK
SLIDE
PAN & ZOOM
GRAPHICOM
PART II
COPY
PAINT
?
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Graphicom Part II is a video processing package that provides many functions that are missing in Graphicom. Here are just a few of the features provided by Graphicom Part II:

ENLARGE/REDUCE/ROTATE
Enlarge or reduce any portion of a graphic screen, just like a photographic enlarger! Rotate by any degree or fraction of a degree around any point on the screen.

PAINT
Paint or "fill-in" any irregular area on the screen! More than 50 different colored patterns available. Additional paint patterns may be user-defined.

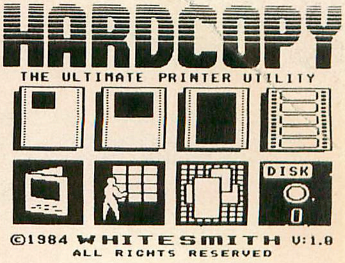
PAN & ZOOM
"Zoom in" x2, x4, or x8 on any portion of the screen to do fine pixel work. Allows editing of Graphicom character sets with ease!

TYPESETTER & FONT EDITOR
Add text in 16 different sizes, also supports user definable foreground & background colors. Design & Edit characters for use in the typesetter.

PIXEL BLASTER
Allows the user to easily substitute or remove colors. Widen lines, swap BLUE & RED without effecting BLACK & WHITE, etc.

Graphicom Part II requires a 64K extended disk basic system, and supports 1 to 4 disk drives, keyboard or joystick (analog or switch type) input. It will load and save both **Standard BIN** files and **Graphicom** screens. All functions support color or Hi-Res operation, as well as the 4 screen display modes.

ARE YOU LOOKING FOR A HI-RES GRAPHIC SCREEN PRINT PROGRAM?



HARDCOPY - Hardcopy is more than just a screen print utility, compare these features with any other graphic dump program on the market;

- Full GRAPHICOM/GRAPHICOM PART II compatibility! Loads STANDARD 6K images, GRAPHICOM pictures, and COCO MAX pictures too!
- BLACK & WHITE or GREY SCALE printing. In GREY SCALE printing, colors are printed as user definable patterns. Supports hi-res in all 4 GRAPHICOM display modes!
- **1x, 2x, 3x PRINTOUTS** - Three menu options are reserved for the most frequently used printout sizes; 1x (quarter page), 2x (half page), and 3x (full page).
- **GRAPHIC LABELS** - The label printing option allows the user to create custom mailing or disk labels with professional looking results.
- **GREETING CARDS** - The greeting card option allows the user to custom design greeting cards using both text and graphics.
- **GIANT POSTERS** - The poster option provides the user with a means of reproducing a hi-res graphic to a multi-sheet poster.
- **SPECIAL EFFECTS** - The special effects option allows the user to directly control the printing directives; ROTATION, X/Y SIZE, X/Y FLIP, X/Y GRID, X/Y FILL, TAB, WINDOW, POS/NEG IMAGE, and more!
- **USER CALL** - Have an application that **HARDCOPY** doesn't quite match? **HARDCOPY** routines can be added to EXTENDED BASIC through the USR command!

HARDCOPY* requires a 64K Color Computer or Color Computer II, and at least one disk drive.It supports 1 to 4 disk drives, keyboard or joystick input. Please specify **printer** and **cat. number** when ordering.
* Due to hardware differences, some features may function differently on certain printers.

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DMP-110	Cat. No. 180WD
DMP-120	Cat. No. 176WD
DMP-130	Cat. No. 182WD
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CGP-220	Cat. No. 181WD

HARDCOPY PRINT UTILITY $29.95

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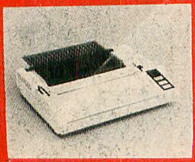

NEW Dual Mode EPSON LX-80

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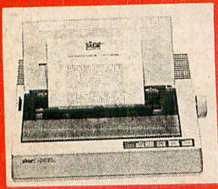
$317 **($7 shipping) Add $29.50 for tractor ET-1**



STAR NX-10

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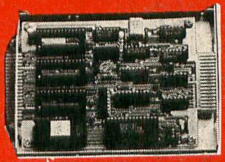

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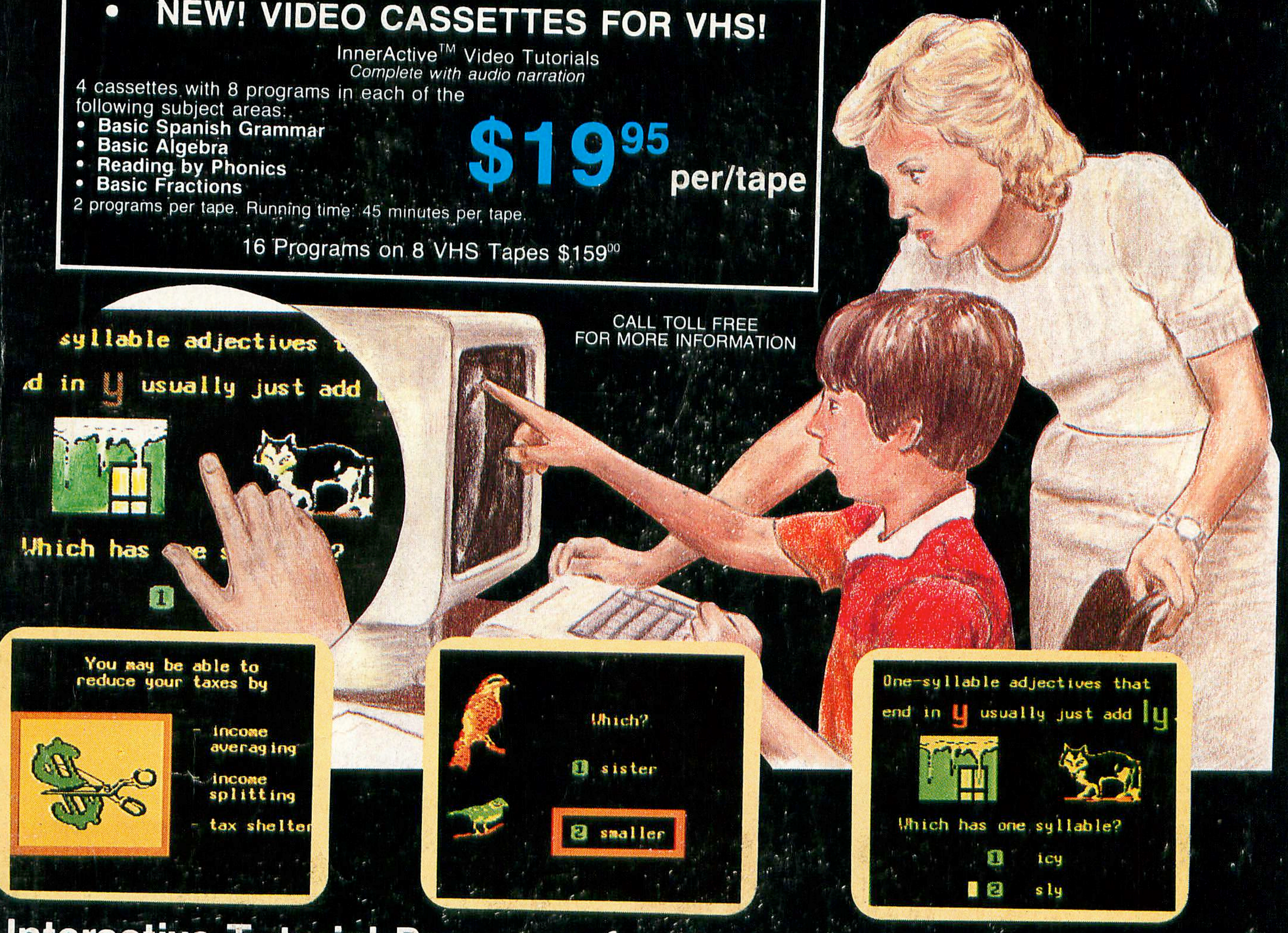

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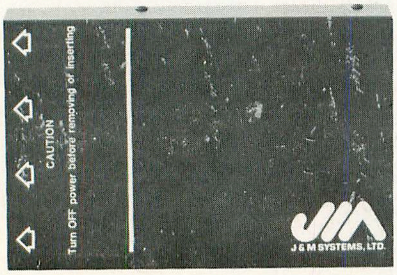

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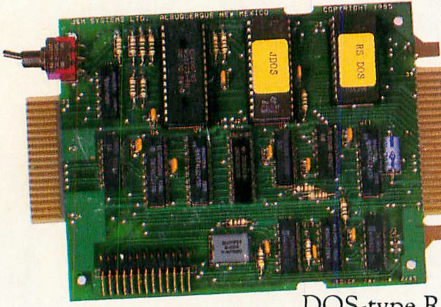

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